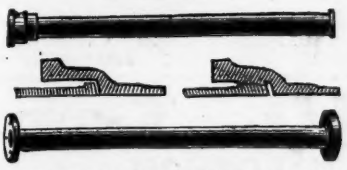
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1848.] LONDON, OCTOBER 11, 1898. [50TH YEAR. PRICE 6d.

GAS AND WATER PIPES
1¼ to 12 IN. BORE.



THOMAS ALLAN & SONS,
Bonlea Foundry,
SOUTH STOCKTON-ON-TEES.
Formerly Springbank Iron-Works, Glasgow.
ESTABLISHED 1848.
ALSO MANUFACTURERS OF
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.
Telegrams: "BONLEA, STOCKTON-ON-TEES."

STURTEVANT GAS EXHAUSTERS.
☞ Send for Catalogue No. 82.
STURTEVANT ENGINEERING CO.,
75, Queen Victoria Street,
LONDON, E.C.
GLASGOW. BERLIN. STOCKHOLM.
AMSTERDAM. MILAN.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores, for Gas and Water Works.
WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

ROBERT MARSHALL;
CANNEL COAL MERCHANT.
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

Wrought-Iron
TUBES
And Fittings and Accessories.
LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.

BIGGS, WALL, & CO.,
GAS ENGINEERS,
49, FANN STREET,
ALDERSGATE, LONDON, E.C.

The "TIMES," REGISTERED.

Twentieth Century Street Lighting.
ELECTRICITY . . . ECLIPSED
BY
CHIMNEYLESS
New Incandescent Burner,
FITTED IN OUR
"DEMAND" LANTERN,
WHICH IS ABSOLUTELY UNIQUE.
WRITE FOR THIS SEASON'S LIST.

The "DEMAND," REGISTERED.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "Evans, Wolverhampton." PLEASE APPLY FOR CATALOGUE No. 8. National Telephone No. 7039.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

NO TAPPETS.

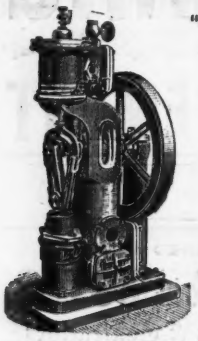


Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

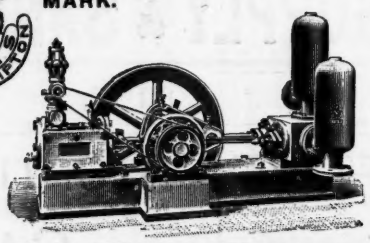


Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

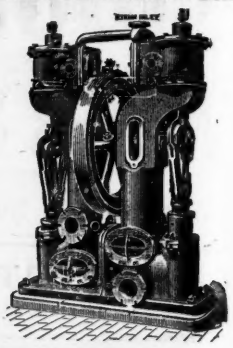


Fig. 713 "DOUBLE-RAM" STEAM-PUMP.

D. HULETT & CO., LTD.,

55 & 56, HIGH HOLBORN, LONDON.

"HANDY" SERVICE CLEANSERS.

Light and Powerful. Price 50s. each.

DRY GAS-METER MAKERS.

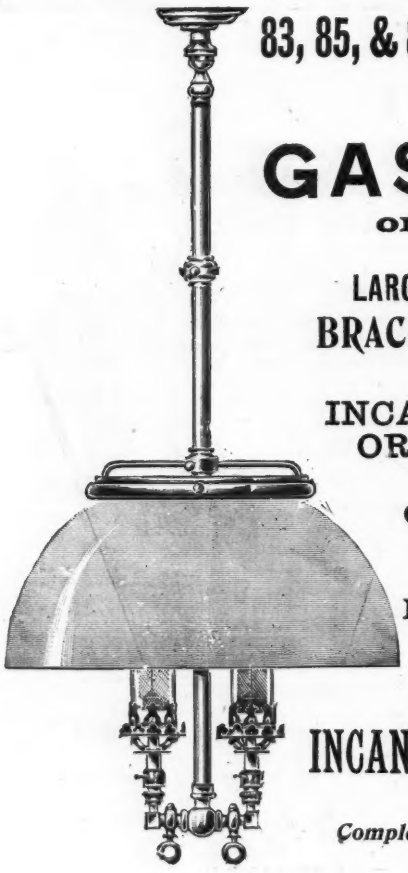
WROUGHT-IRON TUBES AND FITTINGS.

STREET LAMPS & COLUMNS.

Price Lists on Application.

FALK, STADELMANN, & CO., LIMITED

83, 85, & 87, FARRINGDON RD., LONDON, E.C.



Manufacturers of

GAS-FITTINGS

OF EVERY DESCRIPTION.

LARGEST ASSORTMENT IN THE TRADE.

BRACKETS, HARPS, & PENDANTS

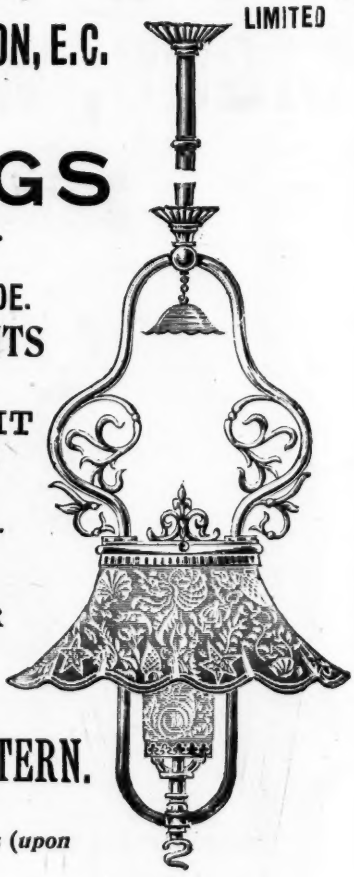
SUITABLE FOR THE

INCANDESCENT GAS-LIGHT OR ORDINARY BURNERS.

GLOBES, CHIMNEYS, &c.

SPECIALITY:

BURNERS SUITABLE FOR ACETYLENE GAS.



THE "VERITAS"

INCANDESCENT GAS ARC LANTERN.

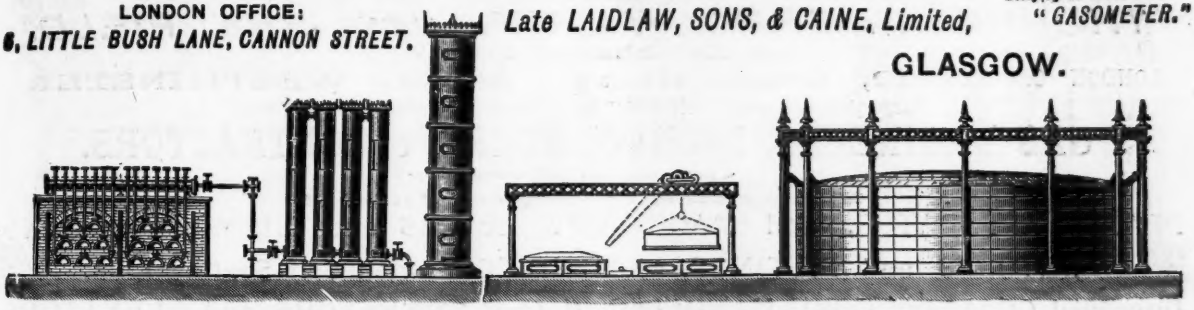
Complete Illustrated Catalogue (425 pp.) gratis (upon application) to the Trade.

THE BARROWFIELD IRON-WORKS, LIMITED,

LONDON OFFICE:
6, LITTLE BUSH LANE, CANNON STREET.

Late LAIDLAW, SONS, & CAINE, Limited,
GLASGOW.

Telegraphic Address:
"GASOMETER."



MANUFACTURERS OF ALL KINDS OF GAS PLANT.

RETORT-BENCH FITTINGS; SIEMENS'S REGENERATIVE AND ORDINARY FURNACES;
CONDENSERS, EXHAUSTERS, AND ENGINES; SCRUBBERS, WASHERS;
PURIFIERS, WITH PLANED AND CEMENT JOINTS;
DRY AND HYDRAULIC CENTRE-VALVES;
HYDRAULIC AND HAND-POWER LIFTING APPARATUS;
GASHOLDERS, SINGLE-LIFT & TELESCOPE; CAST & WROUGHT-IRON TANKS;
STATION METERS; GOVERNORS; SCREW AND RACK VALVES;
FOUR-WAY COCKS AND HYDRAULIC VALVES;
CAST-IRON GAS, WATER, & STEAM PIPES & CONNECTIONS; WROUGHT-IRON TUBES & FITTINGS;
IRON ROOFING, MARKET BUILDINGS, BRIDGES, GIRDERS, STEAM BOILERS;
PROMENADE PIERS AND LOADING WHARVES.

MANUFACTURERS OF OIL PLANT OF EVERY DESCRIPTION.

HENDERSON'S Patent Retorts, Condensers, Stills, Cast and Wrought Iron Tanks, Ammonia Stills, Wrought-Iron Gas-Mains, &c., &c.

DESCRIPTIVE SPECIFICATIONS AND ESTIMATES ON APPLICATION.

GEORGE ORME & CO.,

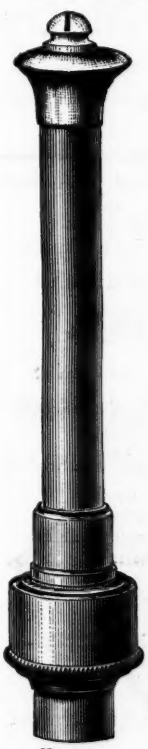
(BRANCH OF METERS LIMITED),

MANUFACTURERS OF IMPROVED WET AND DRY GAS-METERS,

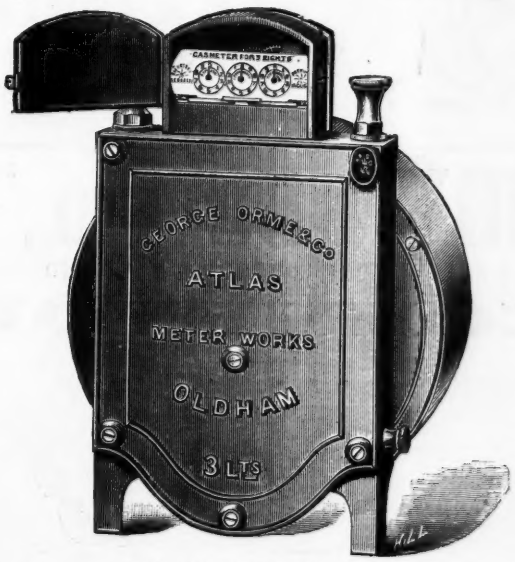
Telegraphic Address:
"ORME, OLDHAM."

ATLAS METER WORKS, OLDHAM.

National Telephone
No. 93, OLDHAM.



No. 200.



WET GAS-METER IN CAST-IRON CASE.

DRY GAS-METER IN STRONG TIN-PLATE CASE.

ORME'S GAS REGULATOR FOR STREET LAMPS.

AS ILLUSTRATION NO. 200.

Adopted by the leading London and Provincial Gas Companies. More than 150,000 now in use.

Main Gas Cocks, Pressure-Gauges, & all descriptions of Gas, Water, & Steam Fittings in stock.

Illustrated Price Lists and full Particulars on application.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

CONDENSERS, SCRUBBERS, and WASHERS.

PURIFIERS with Planed Joints a Speciality.

Patent CENTRE-VALVES, RACK and SCREW VALVES, WOOD GRIDS, and SCRUBBER-BOARDS, CAST-IRON MAINS, and SPECIALS.

STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders. GAS COAL famous for its UNRIVALLED EXCELLENCE.

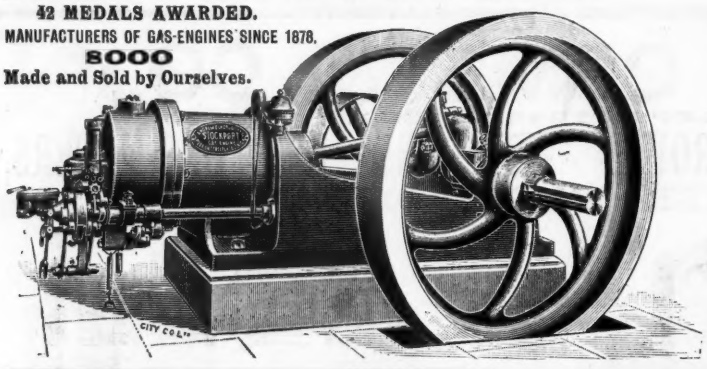
NEW DESIGN "STOCKPORT" GAS-ENGINES.

42 MEDALS AWARDED.

MANUFACTURERS OF GAS-ENGINES SINCE 1878.

8000

Made and Sold by Ourselves.



With Otto Cycle and our own Patented Improvements.
All Sizes from 1½ H.P. to 250 Brake H.P.

SEND FOR LATEST PRICE LIST.

The Greatest Brake H.P. given for the Smallest Gas Consumption.

SIMPLE IN EVERY DETAIL.

J. E. H. ANDREW & CO., LTD.

REDDISH, near Stockport.

London Address: 80, QUEEN VICTORIA STREET, E.C.

DEPÔTS IN ALL THE PRINCIPAL TOWNS.

BARRY, HENRY, & CO., LTD.,

ABERDEEN, SCOTLAND, and 64, Mark Lane, LONDON, E.C.

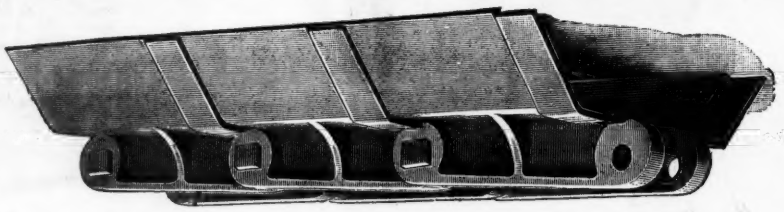
SOLE MAKERS OF HACK & PIGGOTT'S PATENT COKE-CONVEYING PANS AND LINKS COMBINED.

COKE-CONVEYORS.

Specialities:

TRANSMISSION OF POWER.

Rope and Belt Pulleys,
Spur and Bevel Wheels,
Shafting and Couplings,
Pedestals, and Fixings.



Specialities:

TRANSMISSION OF MATERIALS.

Conveyors,
Elevators,
Grinding Machinery,
Motors.

The only Coke-Conveyor which has proved a thorough success.

ALSO HACK AND GILES' PATENT CONVEYOR PAN LINKS.

WRITE FOR PRICES AND PARTICULARS.

The fullest Inquiry invited. Can be seen at work in some of the principal Gas-Works in the United Kingdom, where they are giving the utmost satisfaction.

S. CUTLER AND SONS, MILLWALL, LONDON.

CARBURETTED WATER-GAS PLANT.

ADOPTED AT

HORNSEY.	BUENOS AYRES.	BEXHILL.	
HASTINGS.	SOUTHALL.	HORSHAM.	
SOUTHEND.	PLYMOUTH.	SOUTHEND.	2nd ORDERS.
FOLKESTONE.	HARROW.	PLYMOUTH.	

GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

HAS BEEN ADOPTED FOR MANY IMPORTANT HOLDERS.

IT IS STRONG AND CHEAP, AND REQUIRES NO PIERS FOR ITS SUPPORT.

R. LAIDLAW & SON,

ENGINEERS & IRONFOUNDERS,

CAST-IRON PIPES

ALL SIZES.

MANUFACTURERS OF

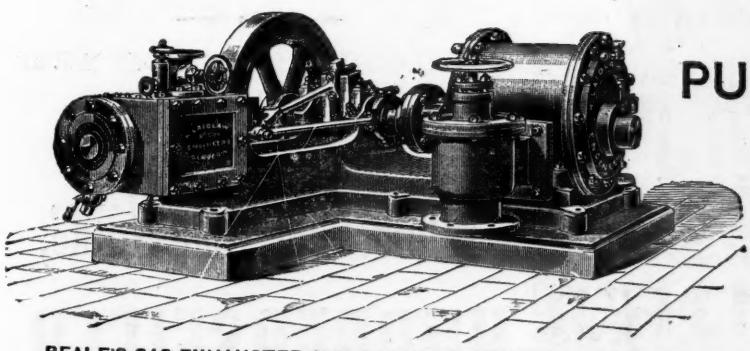
STEAM-ENGINES,

EXHAUSTERS,

VALVES,

AND

PUMPING-ENGINES.



BEALE'S GAS EXHAUSTER AND ENGINE COMBINED. ALL SIZES.

ALL KINDS OF

GAS AND WATER APPARATUS.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

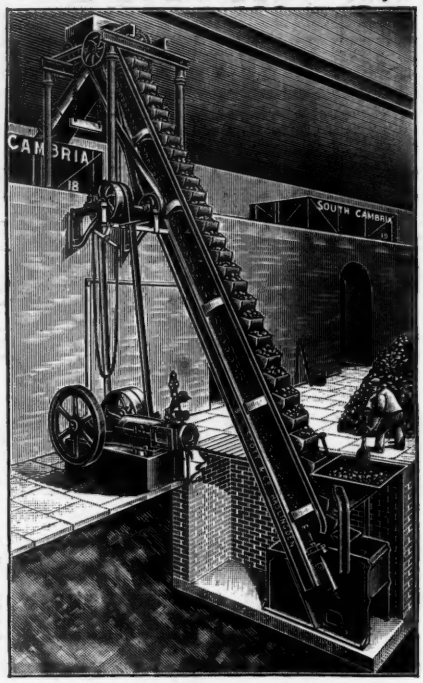
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

A Set of Twelve Condensers, 3 ft. 6 in. diameter by 30 ft. high. *From a Photograph.*

W. C. HOLMES & Co.

MAKERS OF

Retort Ironwork, Patent Scrubber-Washers, Purifiers, Gasholders of all Sizes,

AND

Gas Plant and Structural Ironwork of every description.

CATALOGUES SENT POST FREE ON APPLICATION.

Whitestone Iron-Works,

HUDDERSFIELD.

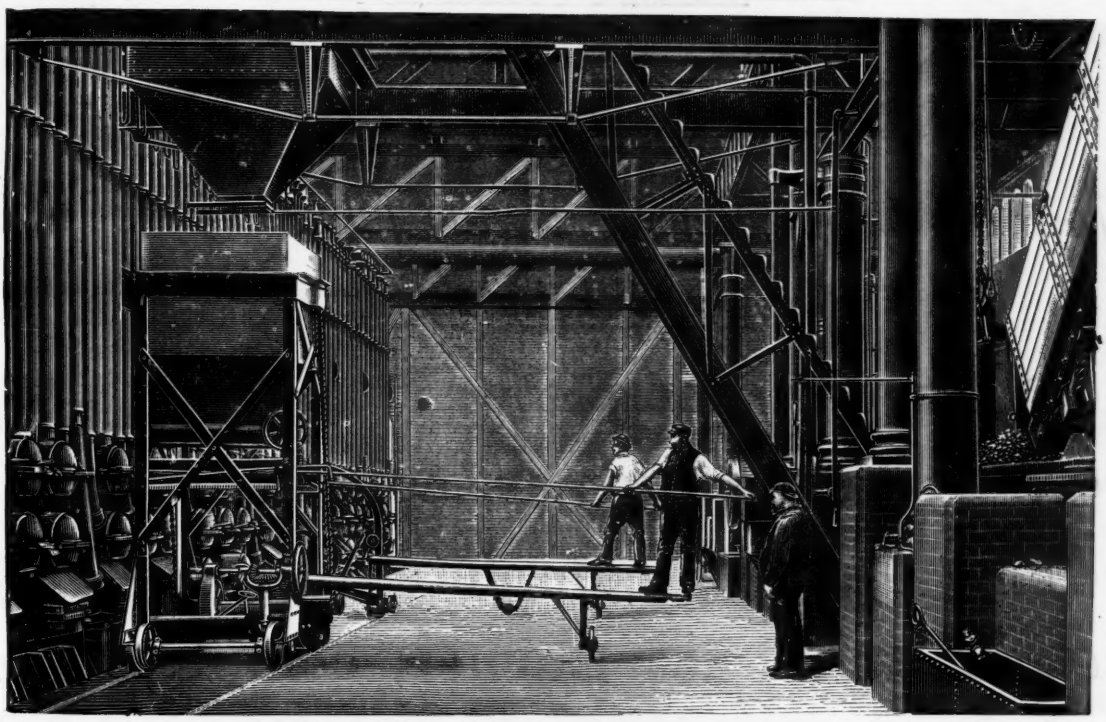
Telegrams: "Holmes, Huddersfield;" "Ignitor, London."

WEST'S GAS IMPROVEMENT CO., LTD.

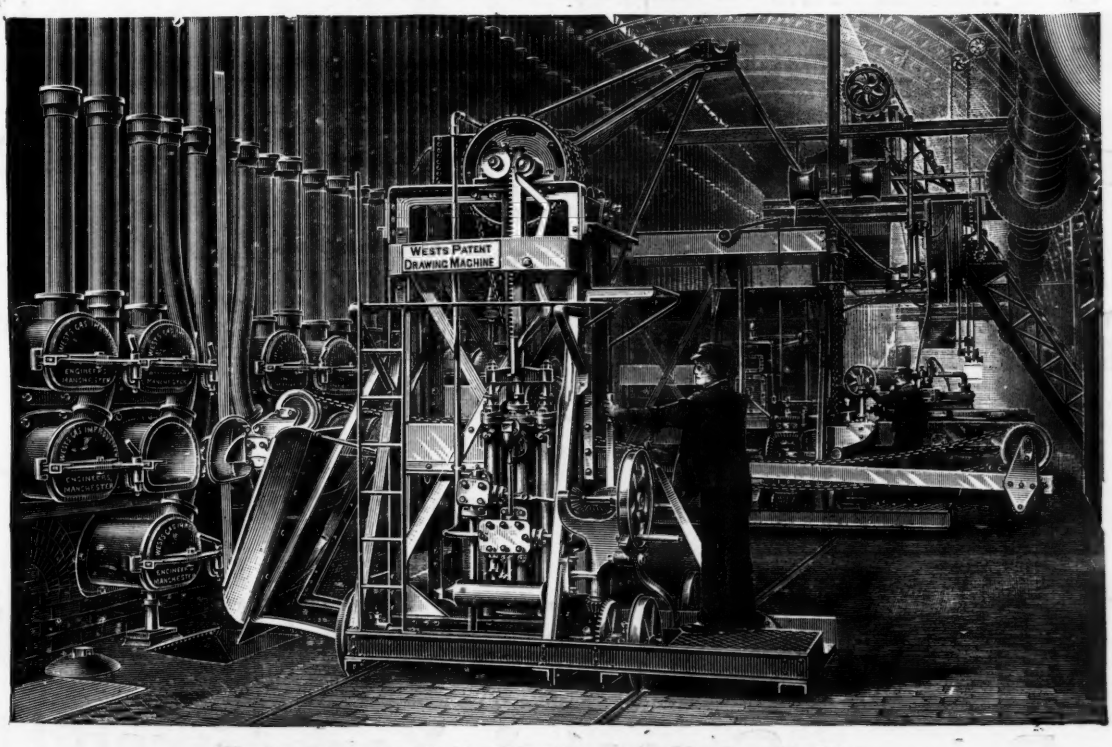
ALBION IRON-WORKS, MILES PLATTING,

MANCHESTER;

And 104, Queen Victoria Street, London, E.C.



West's Manual Charging and Drawing Machines.



West's Compressed-Air Drawing and Charging Machines.

Contractors for

WEST'S REGENERATOR SETTINGS & RETORT-HOUSE PLANT.

INCANDESCENT GAS-LIGHT

(WELSBACH PATENTS).

REDUCTION IN PRICES.

From the 1st of June, 1898, the following REDUCED PRICES will take effect:—

"C" Burner, complete	5/-
"C" Bye-Pass Burner, complete .	6/6
"Gem" Burner, complete . . .	3/6
"Gem" Bye-Pass Burner, complete	5/-
"C" Mantles "Gem" Mantles	1/-

PROPORTIONATE REDUCTION OF PRICES IN ALL PATTERNS.

Great Reduction in Chimneys, Globes, &c.

New Price List on application to

The Welsbach Incandescent Gas-Light Co., Ltd.

Palmer Street & York Street,

WESTMINSTER, LONDON, S.W.

ARDEN HILL & CO., LTD., BIRMINGHAM.

Condensing Stove No. 1094.

A REVOLUTION IN

Gas Fires and their Burners

Constructed on entirely

NEW PRINCIPLES.

Write for Lists before placing orders.

THE "TRAFALGAR"

PREPAYMENT GAS-METER

FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of Pennies in the mechanism at any time.
9. Rejection of Half-Pennies certain.

GUARANTEED FOR FIVE YEARS.

FRANK WRIGHT'S PREPAYMENT GAS-METER CORPORATION, Limited,

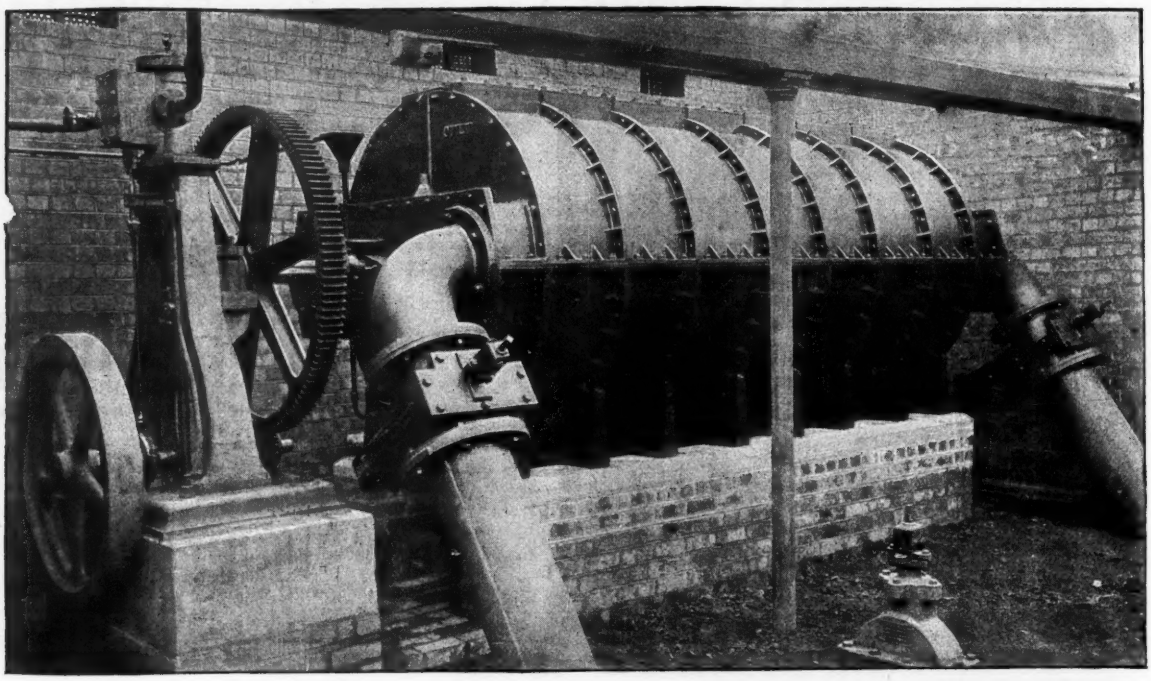
Telegraphic Address: "Gasometer, London."

Manufacturers of Wet and Dry Gas-Meters,
Offices and Works: 62, GLENGALL ROAD, S.E.

Telephone: No. 59 Peckham.

KIRKHAM, HULETT, & CHANDLER, Ld.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.



PATENT "STANDARD" WASHER-SCRUBBER

Extracts all Ammonia and a large proportion of Sulphuretted Hydrogen and Carbonic Acid.

LARGEST MANUFACTURERS IN THE UNITED KINGDOM OF GAS-RETORTS,

HORIZONTAL or INCLINED; also Makers of SEGMENTAL RETORTS of all SECTIONS.

PATENTEES OF
MACHINE-FLANGED RETORTS

B. GIBBONS, JUNR., LTD.

TELEPHONE No. 8010.

DIBDALE WORKS DUDLEY.

Telegraphic Address: "MACHINE, LOWER GORNAL"

SPECIAL BRICKS and BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.

"ABC" Code and UNICODE used for Telegrams and Cablegrams.

Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.

RETORTS and other FIRE-CLAY GOODS CAREFULLY PACKED for EXPORT.

FOREIGN and HOME COPIES of ILLUSTRATED CATALOGUES on Application.

ALEX. C. HUMPHREYS, M.E.
A. G. GLASGOW, M.E. } MM.Inst.C.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

American construction is instanced only when from the LONDON Designs of Messrs. Humphreys & Glasgow.

	Cub. Ft. Daily.		Cub. Ft. Daily.
Copenhagen	700,000	Edinburgh	2,000,000
Belfast	1,700,000	Guildford	350,000
Belfast (Second Contract)	4,500,000	Syracuse, N.Y.	850,000
Brussels	700,000	Brentford	1,200,000
Brussels (Second Contract)	700,000	Commercial Gas Co.	850,000
Liverpool	3,500,000	Commercial Gas Co. (Second Contract)	850,000
Liverpool (Second Contract)	4,500,000	Commercial Gas Co. (Third Contract)	1,250,000
Tottenham	750,000	Bridlington	125,000
Tottenham (Second Contract)	750,000	Middlesbrough	1,250,000
Santiago	400,000	Croydon	1,250,000
Swansea	750,000	L. & N.W. Railway, Crewe	700,000
Manchester	3,000,000	Taunton	225,000
Brighton	1,750,000	Lawrence, Mass.	400,000
Preston	1,500,000	Rotterdam	850,000
New York	1,200,000	Dorking	125,000
Southport	750,000	McKeesport, Pa.	500,000
Bath	1,000,000	The Gaslight and Coke Co., Bromley	3,750,000
Newburgh, N.Y.	350,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Newburgh, N.Y. (Second Contract)	250,000	Durham	200,000
Hoylake	125,000	New York (Remodelled)	11,000,000
Coventry	600,000	Scarborough	800,000
Coventry (Second Contract)	600,000	Perth, W.A.	125,000
Bordentown, N.J.	125,000	Bremen	550,000
Winchester	200,000	Maidenhead	225,000
Shanghai	225,000	Epsom	225,000
Stockport	500,000	North Middlesex	150,000
Norwich	1,000,000	Wandsworth and Putney	1,800,000
Holyoke, Mass.	600,000	Aarhus	800,000
St. Joseph, Mo.	750,000	Falmouth	150,000
Lea Bridge	350,000	Southampton	800,000
Lea Bridge (Second Contract)	350,000	Copenhagen (Second Contract)	2,500,000
Stockton-on-Tees	500,000		

In addition to which the 1891 Installations of The Gaslight and Coke Company, on the Humphreys Double-Superheater System, have a capacity of 12,000,000 Cubic Feet per diem.

IN THE UNITED STATES,

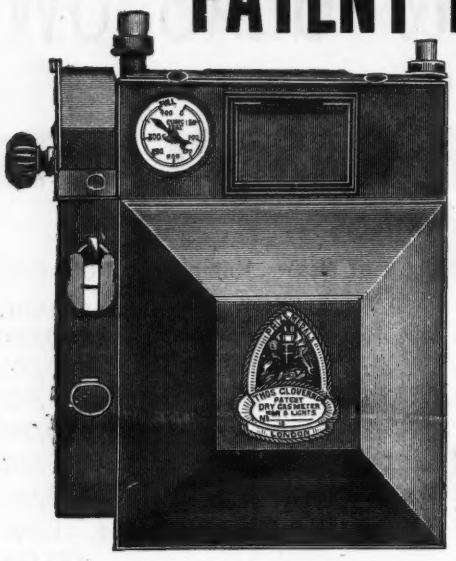
Messrs. Humphreys and Glasgow and their Colleagues The United Gas Improvement Company have jointly constructed 285 Sets of Humphreys Double-Superheater Apparatus with a daily capacity of 208,500,000 cubic feet. Of this volume, 47,200,000 cubic feet daily have been undertaken during 1898.

9, VICTORIA STREET, LONDON, S.W.
Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:
BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725 Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

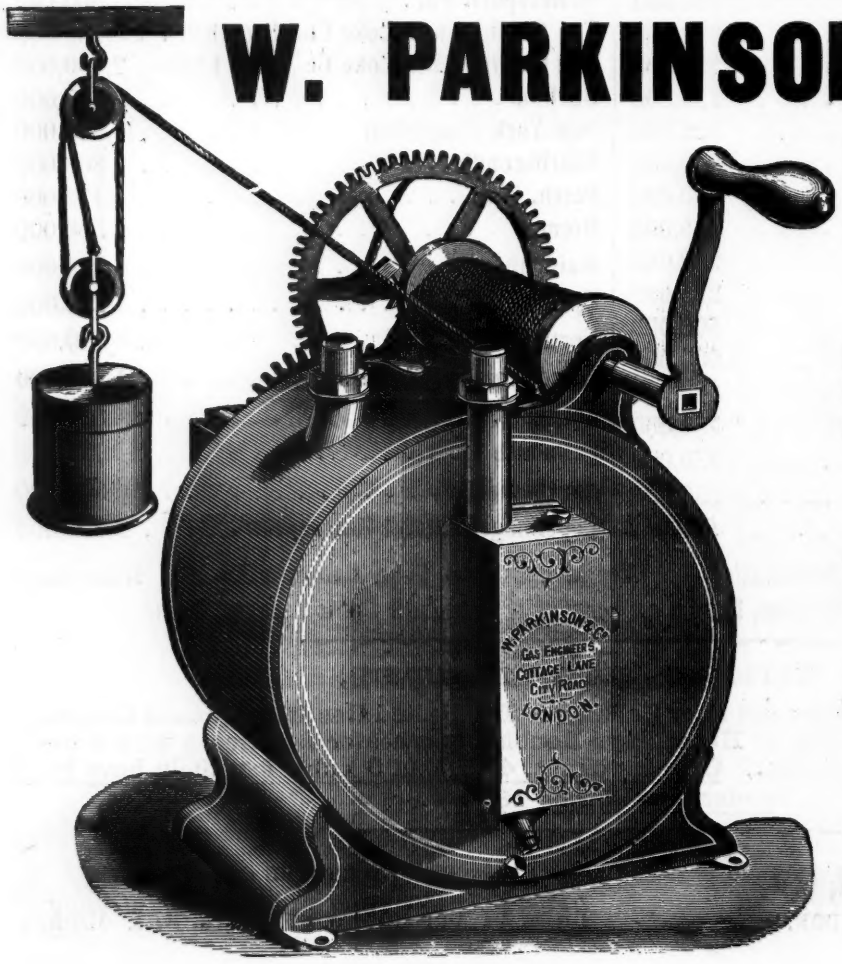
BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1005.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3898.

GLASGOW ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1525 South Side.

W. PARKINSON & CO.



PRESSURE RAISERS

For use in Low-Lying Districts, or wherever increased Pressure is required.

For supplying Cooking-Stoves, Gas-Engines, &c.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
TELEGRAPHIC ADDRESS: "INDEX."
Telephone: No. 778 King's Cross.

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."
Telephone: No. 1101.

CONTENTS.

EDITORIAL NOTES:—
GAS, LIGHTING, &c.— PAGE
The Meeting of the Commercial Gas Company 801
Suggested Reserve Force of Gas Stokers—A Projected Federation of Employers 801
Trade Unionism in the Building Trade 802
Ironmongery Rampant 802
The Public Works Loan Board 803
The Debasement of Waterloo Bridge 803
WATER AND SANITARY AFFAIRS—
The Water Supply at the East-End—The East London Water Company's Meeting 803
The London County Council and the Water Question 804
ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market 805
Electric Lighting Memoranda 805
The Workmen's Compensation Act 806
Gas Acts for 1898 806
The Winter Instructions of the Gas Referees 807
The Second Annual Convention of the League of American Municipalities 807
A Comparison of the Hefner and Carcel Lamps as Standards of Light 807
The Estimation of Sulphur in Coal and Coke 808
NOTES:—
The Benier Gas Producer and Engine 810
Gas-Engines for Dock Pumping 810
A Convenient Form of Drying-Tube for Gases 810
Chemical Notes on the Drying of Linseed Oil 810
The Earliest Water-Gas Plant 810
TECHNICAL RECORD:—
A Comparison of Different Systems of Lighting 811
REGISTER OF PATENTS:—
Service or Meter Governors—Farmer, D. J. & S. 812
Differential Automatic Gas-Governors—Farmer, D. J. & S. . . . 812
Manufacturing Acetylene Gas—Sigurdsson, O. V. 812
Incandescent Gas-Burners—Imray, J. (Kern, O.) 813
Coin-Freed Gas-Meters—Nasmith, J., and Mercer, A. 813
Producing Acetylene Gas—Strode, W. W., and White, G. H. . . 813
Using Calcium Carbide for Generating Acetylene—Dillberg, G. . 813
Acetylene Gas Generator—Dant, H. 814
Patent Notices 814
CORRESPONDENCE:—
The Origin of Gas Associations 814
MISCELLANEOUS:—
Meeting of the Commercial Gas Company 815
Meeting of the East London Water-Works Company 816
The Gas Question in Vienna—Defeat of Dr. Lueger 818
Meeting of the Swansea Gas Company 818
Colonial Gas Undertakings 818
Morley Gas Arbitration 819
Suffocation by Gas in Belfast 821
Edinburgh and Leith Gas Commission—The Price of Gas; A New Market for Coke 822
Proposed New Gas-Works for Glasgow 822
The Price of Gas at Leeds—The Reduction Confirmed by the Council 823
Gas and Electric Lighting at Loughborough—Proposed Acquisition of the Gas-Works and Electric Lighting Powers by the Corporation 823
The Falmouth Corporation and the Gas and Water Works . . . 823
The Devonport Corporation and the Water-Works—The Purchase Scheme Postponed 824
Alderman Miles on the Gas Supply of Bolton 824
Electric Lighting Notes 824
Gas *v.* Electricity at Adelaide 825
The Water Supply in East London—The London County Council and the Water Question; The Position at the East-End and in the Provinces 826
The Projected Welsh Water Supply Scheme for London . . . 828
Notes from Scotland 828
Gas and Water Companies' Stock and Share List 829
Current Sales of Gas Products 830
Coal Trade Reports 830
PARAGRAPHS:—
Serious Illness of Mr. Robert Hunter—Sulphate of Ammonia *v.* Nitrate of Soda for Wheat Growing 804
Thermo-Dynamic Problems 805
Prevention of Rust on Metal Work 807
An American Gas Power Station 808
Institution of Civil Engineers—The New Physical Laboratory at Manchester—Arithmetical Chemistry—The Regenerative System of Gas Lighting 809
Gas "Boycotted" at Barcelona—Reductions in Price—Coke Manufacture by Coke-Ovens in Lancashire—Unaccounted-for Gas at Darlington—Acetylene Gas and Plant Life—The Llanelly Gas Company 814
Gomersal Water-Works Arbitration 817
Wadebridge Water Supply 822
Cowes Gas Supply 824
Sales of Stocks and Shares—Mysterious Underground Fires at Sunderland—Gift of a Village Water Supply 827
Bangor Gas Supply 830
Cost of Opposing the Bury Corporation Water Bill—Hereford Gas Profits—The Relative Prices of Gas and Steam Coals—The Maidstone Typhoid Epidemic—The Reigate Town Council and the Local Gas Companies—The Supply of Water to Townships by Liverpool—Whitchurch Gas-Works Purchase—New Reservoir for Loughborough 831
Atherstone Water Supply—Oldham Gas Workers and their Wages—Blackburn's Water Supply—Gas Explosion Through a Broken Main—West Gloucestershire Water Company—The Public Lighting of Halesowen—Water in the East Kent Chalk Area—Rainford Water Supply—Satisfactory Position of the Water Supply of Hull 832

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Meeting of the Commercial Gas Company.

THE meeting of the Commercial Gas Company on Thursday, under the presidency of Mr. J. Blacket Gill, Chairman of the Company, was replete with interest of a mild, non-controversial kind. The Chairman was able to inform the proprietors that their dividend had been earned, with a balance of £1500 or so to the good; and that the trading prospects of the undertaking are as promising as ever they were at any period of its history. The working during the past half year was satisfactory; some important economies having been effected in the manufacturing department. Nevertheless, the immediate future of the Company is not without cloud. In the first place, it is too true that the current coal contracts were only secured at a considerable advance in price. Mr. Gill did not apologize for this circumstance; merely remarking that the Company do not stand alone in this regard—which is not a particularly strong position to take up. If a gas company were to get into the Bankruptcy Court, it would be but small consolation to find other occupants in the same undesirable situation. Rumour, to which we alluded last week, has it that the Commercial Company were caught in their coal contracts through coming after The Gaslight and Coke Company, whose dealings set the market price, as usual. The pity of it is that the Commercial directorate and proprietary do feel the responsibility for selling gas as cheaply as possible, which is not the case at the Horseferry Road. Repeatedly on Thursday the Chairman of the Company, and after him the Engineer and General Manager (Mr. H. E. Jones), warned the proprietors that the very last thing to be thought of was an increase in the price of their gas. If anything was to suffer from dearer coal and other difficulties, it must be the dividend. The declaration did not evoke the faintest protest.

Besides dear coal, which is purely an accident, the Commercial Company are constrained by law to suffer the stress of most expensive capital—which is a statutory "privilege." It is very remarkable how the capital conditions which were regarded in 1875 as favouring the shareholders have now come to be condemned as prejudicial to the undertaking. As the Chairman reminded the meeting, in 1875 the Commercial Company were rewarded for their promptness in submitting to the sliding-scale, by being allowed to issue their additional capital at par to the existing shareholders. Now the Directors and the management devoutly wish they had not to do anything of the kind. It is a curious illustration of the vanity of human desires. Practically, the privilege means that the management is put to every possible shift to avoid calling up fresh capital, because this costs twice as much as the new issues of the other London Gas Companies. The Directors have borrowed heavily from their bankers; but however they may turn, they are hampered in opening up such a branch of business as prepayment meter supplies, which do not yield much profit under the most favourable conditions. Yet there are proprietors of the Company who would execrate the Directors as traitors if they dared to propose to give up this onerous privilege for the good of the concern! There is not much of the old capital powers left; and those proprietors who have insisted upon having their "pound of flesh" will not have a great deal to congratulate themselves upon when the Company are driven to Parliament. It would have been far better if Parliament had been approached betimes, with the frank admission that the capital powers of the undertaking, although unexhausted, had grown obsolete, and needed bringing up to date. As it is, the aspect of the Company, with the Directors afraid to put into operation the powers which the proprietors are supposed to value so highly, and the management imploring to be spared as long as possible from the burden of necessary fresh capital, is not a gratifying one. Why not confess at once that the exemption from the auction clauses was a "Greek gift," to be relinquished while yet it retains the semblance of something possessing exchangeable value?

Suggested Reserve Force of Gas Stokers—A Projected Federation of Employers.

A GAS ENGINEER who some time since had the misfortune to have to share the heat and burden of a strike of stokers has made a suggestion to us by which he thinks the brunt

of such a contest might well be lightened. Briefly put, his idea is that a fund should be formed by gas companies, with the object of keeping at command (say) a hundred stokers who would be prepared, under a signed agreement, to take up duty in the event of a strike at any of the subscribers' works. This is the basis of the proposal; but, in the absence of further details, it is difficult to regard it in a very favourable light. In the first place, we cannot see how the fund would be utilized. Would the proceeds of its investment be applied to the payment of a kind of "retaining fee" to the stokers who had the courage to enrol themselves, or in giving them a reward in the event of the defeat of the strikers or compensation on a settlement? This is one of the points on which information should be furnished by the proposer. Then, assuming that such a fund was established, where would a hundred stokers be found who would be willing to sign away their liberty of action in the event of a strike? For such a purpose, non-unionists only, and men of mettle and steady habits, would be of use. But such men are rarely in want of employment; and they would hardly be likely to leave regular and comfortable berths for uncertain and risky positions in gas-works undergoing little short of a siege. Moreover, in most works, the stokers are now bound by agreements; and consequently they would not be able to leave their employment at a minute's notice. Then, again, the scheme could only be applicable to works of limited dimensions. We see a difficulty in getting, under such a project, a hundred reliable men; and to have "on hand" the thousand or two thousand men who would be required in an emergency in some of the large gas-works, seems to be scarcely practicable. However, these are merely a few thoughts that arise in considering the scheme in its crude form; and if the proposer will enter into the matter in more detail, he may perhaps remove the difficulties which present themselves. He has himself passed through the mill; and his idea may be the result of much subsequent meditation.

Since the foregoing was written, particulars have reached us of a scheme which, presuming it eventually takes definite shape, may facilitate the carrying out of the project we have been considering. It appears that a proposition is on foot for establishing a federation of employers on a large scale. The scheme has been "in the air" for about a year; and we learn that it is now practically complete. We hear a great deal in the present day about the Federation of Labour; and the recent engineers' and miners' strikes have shown what can be done by a Federation of Capital. Approval of the present movement has been expressed by a considerable number of employers' associations, representing a great variety of trades throughout the United Kingdom; and it is stated that nowhere is the proposed federation likely to be stronger than in Lancashire and Yorkshire. We believe the idea originated with Mr. George Livesey, and had the support of the late Colonel Dyer; while Sir W. Lewis is among the employers who are engaged in carrying it out. With so powerful an organization as this at work, the project dealt with in the preceding paragraph appears less chimerical than it did at first glance. At all events, it is a subject on which an expression of our readers' views will be helpful.

Trade Unionism in the Building Trade.

THE effects of Trade Unionism in the building trades were described in very plain language before the Labour Commission; and matters do not seem to have much improved in this regard, if one may judge from recent events at Leicester, and some correspondence in the "Daily News." The term "master" has apparently ceased to have any proper significance in these trades, and should be dropped in favour of some such word as "money-giver," which is much more expressive of the function reserved for the employer under the rule of Trade Unions. There is no particular reason why Leicester should have furnished the latest illustrations of the actual state of labour in the building trades, which is probably in pretty much the same condition everywhere; but, according to the newspapers, affairs seem to have come to a climax there. The Leicester Master Builders' Federation find themselves face to face with a labour revolt which has been brooding for a long time. The local Building Trades Council last week called out the carpenters and joiners employed on a certain job, for the reason that they had been required to fix ready-made joinery, "which had been prepared either by some "foreign firm or by some non-unionist house. The result "was that the other operatives employed on the same con- "tract came out on strike as well." The Master Builders' Federation thereupon announced that, unless the men returned to work forthwith, they would be locked out as from the beginning of this week. The Society declined to order the strikers back; and accordingly the decision of the Federation stood. The employers complain that the strike is in contravention of an award made in April last, under which neither strike nor lock-out was to take place until the cause of dispute had been discussed by the Presidents of the two Councils of employers and employed. Fears are expressed that the disturbance thus originated will spread over the entire Midlands; but even this would not be an unmitigated misfortune in the circumstances. Another Leicester strike has been precipitated by the rashness of a contractor for building repairs in finding fault with a Society bricklayer's work. The misguided employer ventured to condemn a specimen of bricklaying, and required it to be done over again. The order was spurned; and another bricklayer—also a Society man—was requisitioned to make good the defects. This gave such dire offence to the Society, that they blacklisted the second man as "objectionable," and demanded his discharge from another job. The contractor declined to yield; and the whole of the men turned out on strike. It is difficult to see how any work is to be carried on until this sort of thing is radically dealt with. [Just before the "JOURNAL" went to press, the news came to hand that both these threatened strikes are "off." The heads of the Trade Unions implicated have thought better of it; and accordingly, in obedience to their orders, the free and independent carpenters, joiners, and bricklayers of Leicester have gone to work again.]

In London, as an architect has explained in the "Daily "News," the bricklayers and the plasterers exhibit the perfection of "organized idleness." It is not a question of wages. The men referred to are paid the full Trade Union scale, and more; but they will neither keep the regular hours nor return a fair day's work for their money. They do not pay the slightest attention to the foreman; but loiter openly over their job. Another writer narrates how on one of his contracts the bricklayers objected to the general foreman spending so much of his time on the scaffold looking after them. "Brickwork, which a few "years ago cost £3 to £3 10s. a rod for labour, now costs "anything from £7 to £10." The suggestion is that something must be done to put an end to so disgraceful a state of things. Nothing short of the remedy applied to the engineering trade will effect a permanent cure.

Ironmongery Rampant.

IT is unfortunately only too true that shopkeeping narrowness of mind and selfishness are still to be found in many places where liberal views of trade might be expected to prevail. The supply of gas stoves and fittings on easy terms by Local Authorities has often been strongly opposed by the ironmongers and the plumbers of the town; and Sheffield was recently put to the expense of a poll of the owners and ratepayers at the instigation of a handful of tradesmen who objected to the Corporation Electricity Supply Department doing its own wiring. It is rather amusing when grasping shopkeepers quarrel among themselves over the division of the spoils of trade, as frequently happens. There is a very well-conducted trade journal called the "Ironmonger," which is a faithful servant of the metal trades. It is entertaining to find in the pages of this periodical unconscious evidences of the habit of the shopkeeping mind that refuses to rivals the liberty of enterprise which it claims and exercises for itself. Thus, while it would be difficult to name, upon the authority of his trade journal, a class of articles in which an "ironmonger" may not deal, it complains loudly and bitterly of other descriptions of shopkeepers, such as drapers, who invade the hardwareman's preserves. What is sauce for the goose is anything but sauce for the gander here. One could understand this trade jealousy better, if there were any craft "mystery" in the case, such as in a measure excuses the skilled artisan's objection to the "handy" labourer's promotion to look after a machine tool. Though this natural objection has been run to death in the Trade Union interest, intrinsically it is a good one, which fair-minded employers will invariably respect. The skilled workman who has attained his grade by means of a long apprenticeship, or

some equivalent probation, has a natural right to the easy things of his trade—the "bits of fat"—just as it is his duty to do his best in the difficult and arduous passages of his calling. But in the case of the so-called "ironmonger," who keeps a shop for the sale of hardware, the chances are nowadays that he is no "tradesman" at all, in the strict sense of the term. Time was when the public resorted to the ironmonger to get things made—a job of forging, or whitesmith's work, or what not. But our contemporary has often had occasion to complain that modern keepers of hardware shops do not know their trade, and cannot execute the simplest order otherwise than out of the stock of ready-made goods.

Take the number of the "Ironmonger" for Sept. 3. In one column there is a complaint that of half-a-dozen ironmongers in a Welsh town, not one could supply a spike for a walking-stick to be used in hill climbing. Overleaf there is a recommendation of "inexpensive suites and cheap "deal furniture, *suitable for ironmongers who do a medium "class of trade.*" The italics are ours. The cream of jokefulness of this kind is to be found in the "Correspondence" column of the same number, where a worthy ironmonger narrates how he "collared" the work of a local Water-Works Committee. This enterprising personage studied the medical officer's reports, and foresaw that a local board would have to be formed to deal with the question of water supply. As he very naïvely says: "Now was my time. "Although not in a large way of business, I determined to "go upon the board, and I was elected. When the water "and sewerage works were undertaken, I was placed upon "the Committee. I fought down every proposal to the "work getting into the hands of plumbers, some of them "being members of the board. . . . . I advertised in "the local paper, dressed one of my windows out with "plumbing goods, bought some good stuff, and kept it well "to the fore. Since the water has been laid on—some "two or three years—I have fitted up over one hundred "houses, shops, public buildings, &c." This is very rich—and so, probably, is the ironmonger who discomfited the plumbers. That in the ironmonger's but a bit of good business, which in the plumber is rank robbery! All this may be borne in mind by corporation gas committees desirous of delivering their consumers from ironmongering interest. Like another ubiquitous character, the ironmonger, if resisted, will probably flee—to open a window dressed out with carpets, pleasingly relieved with patent medicines in ornamental tin boxes.

The Public Works Loan Board.

THE twenty-third annual report of the Public Works Loan Board for the last financial year states that the Commissioners made during the year 583 advances for sums amounting altogether to £1,305,374. The marked decrease which took place in the advances for the previous year continued during the first half of the year 1897-98, until the alterations that were made in the terms of the Board's loans by the Public Works Loans Act, 1897, came into effect. Then the business revived. It is remarked, by way of explanation, that Parliament has always intended that this Board should be empowered to lend money upon more favourable terms than could be obtained in the open market, with the object of encouraging and assisting in the carrying out of the particular class of public works falling within the purview of the Board. As time went on, however, the special terms which the Board were enabled to offer failed to attract borrowers, who could, and did, resort to the open market with advantage. Accordingly, the Act of 1897 was passed, completely altering the terms for the Board's loans. All loans on security of local rates, including loans on securities guaranteed by local rates, are now placed on the same footing as regards the rates of interest, without any distinction as to the purposes for which such loans are required; and the minimum rate of interest has been fixed by Parliament at 2¾ per cent. By the Act of Parliament and the Treasury Minute issued thereunder, 30 years' loans are charged at the rate of 2¾ per cent., 40 years' loans at 3 per cent., and 50 years' loans at 3¼ per cent. interest. The Treasury have also power, upon the recommendation of the Board, to extend the period of loans. The general effect of these alterations is that the Board now lend for purposes for which they seldom lent previously. For example, they lent the Cowes Urban District Council £55,562 for the purchase of a gas undertaking and incidental expenses, repayable within 40 years, with interest at 3 per cent. Several Local Authorities had loans for electric lighting purposes, repayable within 25 years, at 2¾ per cent. interest. Repayments to the Board are made either by way of annuity, in equal instalments of principal and interest combined, or by equal instalments of principal, with interest on the principal from time to time outstanding. The latter is the favourite plan. Borrowers had a way of paying off loans before they became due. But in 1895 the Treasury issued a Minute requiring the payment of a premium on loans paid off in advance; and this placed a check upon the practice. The policy of the Treasury is to induce Local Authorities to curtail the duration of their loans, so as not to unduly burden the rates of posterity, which is certain to have its own requirements to meet. This is the reason for the institution of the sliding-scale of interest, under which long-period loans pay a higher rate than those granted for a short time. There will be no more 100 years' loans, excepting under Special Acts of Parliament framed with regard to very exceptional circumstances.

The Debasement of Waterloo Bridge.

THE protest which we made in these columns months ago in respect of the maltreatment by the London County Council of Waterloo Bridge in the matter of lighting, has received lively but tardy support in the current number of the "Artist." Our artistic contemporary remarks, with justice, of the bridge lamp-posts: "Any fool can see that, "on a bridge like this, they ought to be ornamental and "dignified, and in keeping with the bridge—not vulgar, "skimpy things like these." But it must be a superior class of fool to the members and officials of the County Council who did this thing; for they do not seem to be conscious of their folly. Who are they, at any rate? Who is responsible for this hacking about of a priceless monument, this vulgarization of a truly unequalled site? Supposing a common citizen of London, upon discovering the County Council workmen defacing, with the regulation "Union stroke," the substance of Waterloo Bridge, had echoed the "Woodman! spare that tree!" sentiment, and defied the iconoclastic hammer. He might have been "run in;" but he would have saved the bridge. Unhappily, the opportunity is gone. Now the public have a right to know whom to thank for this addition to the claims of the County Council upon the gratitude of the Metropolis. Strangely enough, nobody comes forward to grasp the honour. Our "Progressive" ædiles are not usually so retiring. The worst of it is that one never knows where this kind of thing will end. If the cheapest and poorest pattern of lamp-post that can be had is deemed good enough for Waterloo Bridge, what standard of elegance and efficiency in this regard is likely to be worked to in other less noteworthy localities? London has suffered far more than can well be expressed from the neglect by the town authorities of the small amenities of the street and its appurtenances and fittings. Unless the County Council are brought to book over this Waterloo Bridge vandalism, the greatest capital the world has ever produced will be branded with a pettiness and poverty, as regards the things in the street, that catch the eye, of which any provincial village authority would be ashamed. Whether London is lit by gas or electricity, let it be done worthily.

WATER AND SANITARY AFFAIRS.

THE calm and strictly matter-of-fact statement made by Mr. George Banbury at the half-yearly meeting of the East London Company on Thursday last, must be held, on every ground of equity and common fairness, to vindicate the conduct of the Company in their management of the water supply, including all that relates to the recent recourse to the intermittent system. Any reasonable person may be convinced by the appeal thus made to a sober judgment; but the opponents of the Metropolitan Water Companies seem to have suspended the exercise of every reasonable faculty, in order that they may indulge in vehement and irrational accusations. Doubtless there is method in the madness, and there is an end to be served that inspires the attack, in the pursuit of which every form of warfare is considered fair. There are those who follow blindly in this onslaught; but there are others who lead them who know perfectly well what they are about. The battle-cry—if so we may term it—is "Let us go to Wales." This is

to be done "at once," as though it were a mere step across a stream; and all the crusade against the Companies is directed to this goal. But there is something else behind. There are the Water Companies already in possession of the existing supply; and they must be dealt with before Wales can be entered upon. "Let us secure the land," is one appeal, and the water-works can be established by-and-bye. The by-and-bye is a long way off—at least a dozen years, according to Sir Alexander Binnie's showing. So the best must be made of present means; and the practical question for London is whether anything better can be done than what the Companies are doing. Could the County Council have had its own way, there would have been no extension of the East London reservoirs, no junction of the Companies' mains, and no Staines reservoirs scheme. Such has been the admirable "foresight" of the Progressive party at Spring Gardens—a mode of proceeding so well adapted to embarrass the Companies and to cripple the supply. Purchase is felt to be a necessary evil, which has to be mitigated by every stratagem which can force down the price. As Mr. Stuart signified in last week's debate, the Council are looking out for "a valuable "asset." If in one way millions are to be added to the capital account, in some other way they must be cut off.

Present prospects of rain do not preclude the question—Has there been a drought? The East London Chairman shows that there has been. Nearly the whole country indicates it, Continental rivers show it, and the vintage report from Oporto declares it. Somehow or other, the thunderstorms proper to hot weather have been absent. The East London Company have made fresh reservoirs, once and again; but the rain came not, and the springs had a stinted flow. The existing reservoirs, full in June, have been well-nigh depleted; the inflow being deficient despite all care as to the outflow. Waste has done its wicked work, and has made still worse the havoc caused by what Mr. Banbury properly calls "the forces of Nature." Irresponsible critics can laugh at this; but there is the fact of a rainfall so deficient as to beat all record, reducing the River Lea to a lower point than was ever known before. There are subterranean waters, and it would seem that by direct application to this source is to be found material help in the future; only when wells are proposed there is an outcry that this is merely taking water from the rivers in another form. But the East London Company have sunk wells, and are sinking more; and the wells they have are declared by Mr. Banbury to have been their "salvation" at the present crisis. As for these wells draining the Lea, a thick stratum of London clay intervenes to cut off any connection with the river. If it be asked what kind of "salvation" the East London consumer has enjoyed, an answer is furnished by a statement given in "The Times," and lately reproduced in our columns, showing that out of twenty-five large towns in England and Wales, no fewer than thirteen are putting up with less water than East London has in its restricted supply. In addition it is to be observed that three of the London Companies are at the top of the list; not one of the provincial towns having so large a quantity per head as these are giving. As if to counteract the effect of these statistics, a deputation from an Association which undertakes to defend the East London consumers, waited upon the Water Committee of the County Council on Friday, and stated that in New York the daily supply per head was 84 gallons, and in Marseilles 99 gallons. Of course, this is simply intended to dwarf the East London supply of 24 gallons per head. It is also remarked that the latter quantity includes the requirements of factories and the watering of roads. The same condition applies to the data given in "The Times;" and in the manufacturing towns the proportion which goes to the factories is much larger than in London.

The deputation above referred to, from the Consumers' Defence Association, urged that the County Council should take action in the Law Courts against the East London Company on the subject of a full charge for a restricted supply. This is a matter which is coming before the Railway and Canal Commissioners; but it seems particularly attractive to the East-end agitators, so that they cannot have too much of it. Yet there is a law standing in the way which somehow fails to command the attention or the respect of these gentlemen. The Metropolis Water Act of 1871, in the portion that treats of the constant supply, contains a section which says: "Notwithstanding anything in this "Act, a company shall not be subject to any liability for "not giving a constant supply if the want of such supply "arises from frost, unusual drought, or other unavoidable "cause or accident." The exemption is carefully guarded by the phrase "unusual drought." That the drought which has affected East London is "unusual," is apparent from the circumstance that such a protracted absence of rain does not appear in any previous meteorological record with respect to England. Mr. Banbury, in his speech, made a quotation from the "Pall Mall Gazette," showing that the deficiency in the rainfall had deprived London of 102,000 million gallons, or a sufficient quantity for fifteen months' supply. This is not a mere question of a few hot months in the summer. There has also been a dry winter; and in the twelve months, as stated by Mr. Banbury, the rainfall has only been some 12½ inches, as compared with the usual average of 24½. In the last nine months, the supply from the clouds has fallen 50 per cent. below the average. If the Progressives, or whoever they may be, desire a greater drought than this, they must be prepared to see every Water Company in London distressed, and Mr. M'Dougall's vision of an expiring Thames fulfilled.

To-day the County Council resumes the debate which it commenced on Tuesday last in reference to the water supply of the Metropolis. Apart from the rodomontade of Mr. Crooks, there was in last week's debate something explicit, however incorrect, in the statements put forth by Mr. Stuart. The latter repeated the already refuted allegation, that the present distress in the East-end was due to the delay of the Water Company in putting into operation the power which they themselves had sought and obtained for taking an auxiliary supply from other Companies. In reply, it may be sufficient to urge that there was no delay in taking a supply of 6 million gallons per day from the New River Company; and in regard to the Southwark and Vauxhall Company, nothing could be done until the passing of the Company's Bill on July 25. Granting that possibly there was a loss of a fortnight in commencing the requisite works for carrying a main through the Tower Subway, this may be put in contrast with the conduct of the County Council in throwing back the water supply of East London a whole year by its fatal opposition to the Bill of 1893. As we have already pointed out, if the same tactics had succeeded in 1894, East London would have suffered the want in the present year of the 600 million gallons contained in the reservoirs sanctioned by the second Bill. Mr. Stuart, as an expert general, may well try to create a diversion, so as to distract attention from the mischief wrought by himself and his colleagues. But, leaving this part of the subject, and proceeding to consider the vital question of whether it is necessary—or will be in the course of years—to go to some remote region in search of water for the supply of London, we observe that fresh evidence is forthcoming in confirmation of the idea that a large flow of water from the chalk areas into the sea is continually going on along the south-east coast. Sir John Evans may allay his apprehensions that deep wells in the chalk will affect the open streams. There is proof given that a vast subterranean source of supply exists, which at present only feeds the sea, and which engineering skill will be able to turn to account, probably by the employment of means attracting little notice, and requiring only a moderate outlay of money.

Serious Illness of Mr. Robert Hunter.—The professional colleagues of Mr. Robert Hunter, of Chester, will be sorry to learn that he is lying in a critical condition as the result of a paralytic seizure while at the works last Friday. Mr. Hunter has been out of health for a year; and about the middle of August, acting upon medical advice, he took a voyage to the Canaries. The trip proved an enjoyable one; and Mr. Hunter returned, after a month's absence, feeling much better than when he started. Unfortunately, however, the journey was not productive of any permanent benefit. We regret to state that yesterday he was rapidly losing strength.

Sulphate of Ammonia v. Nitrate of Soda for Wheat Growing.—The last number of the "Journal of the Royal Agricultural Society" contains a communication by Dr. Voelcker, giving the results of experiments carried out at Woburn in growing wheat under various conditions of manuring. The best kinds were the produce of plots dressed with mineral manures and sulphate of ammonia. A comparison between these plots and those dressed with nitrate of soda revealed a marked difference in the produce. There was an increase in the quantity of tail corn, and a much lower weight per bushel of dressed corn, in the plots treated with nitrate.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 829.)

Business in the Stock Markets in general was of very small proportions last week. The public showed no turn for enterprise whatever; but rather a pronounced disposition to wait a bit and see what was going to happen. For this probably we have chiefly to thank the political outlook, which is disagreeably uncertain; the present state of internal unrest in France being capable of tempting a weak Government into foreign complications, if only as a distraction. So the markets were very quiet and dull; and they grew flatter as the week passed on. Prices for the most part are down, though the fall was nowhere heavy—Consols having about the worst of it. Apprehensions of dearer money had something to do with this; and eyes are looking anxiously towards Berlin, where there is a run on gold. In the Gas Market, there was quite a revival of business; and the quietest week on record was succeeded by one which was really brisk and lively. Every variety of issue was dealt in; and the general tendency was very steady. Changes in quotation were few, and, with one exception, unimportant. In Gaslights, there was considerable dealing in the "A" stock, at close figures touching 295. At one time, it seemed inclined to rise a little, but could not quite manage it. Dealings in the secured issues also were more extensive; and the "K" had a nice rise, while all the rest stood very firm. South Metropolitan was fairly active, and commanded good steady prices, but without any advance. The debenture stock, however, was put up a point. Again there was nothing in Commercial. At the meeting on Thursday, a further issue equal to 10 per cent. on the existing capital—half in new stock and half in debenture stock—was authorized. In the Suburban and Provincial group, there was little doing, except in Crystal Palace, which was unusually busy. Alliance fell back half a point. Among the Continental Companies, attention centred chiefly on Imperial; and prices rose with buoyancy on the intelligence that the Municipality had come to terms with the Association. Union and European were firm and unchanged. None of the remoter undertakings presented any feature calling for remark. Business in the Water Companies was very quiet; and not remarkable for anything beyond the prevalence of good steady prices.

The daily operations were: Gas opened more animated on Monday; and all stocks commanded steady figures. Alliance fell ½, without business being marked. Tuesday's operations were mostly in Gaslight "A" at good middle figures. Imperial rose 2; and South Metropolitan debenture, 1. Wednesday's business was largely in Gaslight issues of all sorts; and the "K" moved up 3. Imperial also gained 3 more. Gaslights were left alone on Thursday; but many other issues were briskly dealt in—quotations remaining unchanged. Friday was a good day; and prices all round were strong and buoyant. The only change, however, was another rise of 2 in Imperial. In Water, New River gained 3. Saturday was fairly active; and Imperial advanced 1 more. In Water, Southwark and Vauxhall preference improved 1½.

ELECTRIC LIGHTING MEMORANDA.

Mr. J. Blacket Gill and the "Light of the Future"—The Case of St. Pancras—The Right Place for Street Lamps—An Inquiry from Adelaide.

At the ordinary general meeting of the Commercial Gas Company, last Thursday, the Chairman (Mr. J. Blacket Gill) mentioned an article that had appeared in the "Daily Telegraph" entitled "The Light of the Future," and proceeded to re-assure the assembled proprietors of the ability of the Gas Company that serves the East-end of London to survive the realization of the prognostications of the newspaper writer. It will strike most of our readers that the title in question lacks novelty, having done frequent service in every newspaper published in the English language these many years past. When Mr. Gill referred to its latest re-appearance, and gave it the honour of inclusion among the topics proper for a half-yearly address to the shareholders of a London Gas Company, those who had not read the article must have received the impression that it contained important intelligence respecting the advance of electric lighting. Having looked into it, however, we are able to assure our readers that the article is nothing more than a "popular" account of the St. Pancras Vestry electric lighting undertaking, partly in the form of an "interview" with the Vestry Electrical Engineer (Mr. S. W. Baynes). It is a little difficult for a technical journal to keep in touch with the daily newspapers as regards the matter of special articles appearing from time to time in the latter, in which the province of the technical journal is apparently invaded. Usually the newspapers do not get hold of such matter until long after the technical journal has done with it. But, of course, the general newspaper reader does not see the technical journal; and he is therefore apt to make his first acquaintance with the particular subject in the form of the newspaper "hash," instead of as a fresh bit of technics.

In the instance in point, it is not to be supposed that Mr. Gill's audience of Thursday comprised many habitual readers of the "Journal;" though, as a matter of fact, we have the satisfaction of knowing that a considerable number of people whose connection with the gas industry is strictly financial do read these columns regularly, with the laudable object of learning what they can as to the course of the industry as a whole. The "Daily Telegraph" article would not tell these initiated ones anything new about the prospects of electric lighting. We not infrequently mention the St. Pancras undertaking, and did so as recently as Aug. 30, in regard to a little upset of the distributing system in the neighbourhood of the Regent's Park. All the same, it is interesting to know what Mr. Baynes had to tell the newspaper reporter concerning the progress and prospects of the undertaking. Last year the Vestry received from private consumers a rental of nearly £30,000, upon a capital investment of £210,691. The gross profit amounted to 7·54 per cent. upon the capital, out of which interest, sinking fund, insurance, and depreciation should have been provided, but was not. The Vestry preferred to credit themselves with a "surplus" of £6518, instead of making proper provision for the future, which would require more than every penny of the so-called profit. With this consideration, of course, the executive staff have nothing to do. It is more to the point to learn from Mr. Baynes that the new arc lights which the Vestry are putting into the streets are of the closed type, which will go for 180 hours without attention, and are being fixed on the kerb. Thus the whirligig of Time brings about its revenges. We have often argued in the "Journal" that the vaunted "improvement" which the electricians claimed to have effected in street lighting by ranging their arc lamps along the centre of the roadway, is no improvement at all. The "young lions" of electricity supply were far too proud, not to say conceited, to learn from those who had had to find out all about street lighting before they came upon the scene. They undertook to do the whole thing upon fresh lines of their own devising, which did not agree with the common practice of gas engineers. Having failed to persuade highway authorities generally that the proper way of lighting a thoroughfare is to sling lamps across it by means of wires, they next undertook to align their arc-lamp standards centrally in thoroughfares delivered over to their tender mercies.

Now they have discovered their mistake—or, at any rate, Mr. Baynes has found it out in St. Pancras. He is not ashamed to confess that "lamp-posts are rather an obstruction in the roadway; and repairs, when necessary, are costly. . . . Lately something was being done to the road beside a centre light, so that all the traffic was sent to one side of the stand. A 'bus broke down between the kerb and the light; and in consequence the road was blocked. This would not have been the case if the lamp had been on the kerb." It is still averred that kerb lighting is wasteful of light; but is this really so? Does it not give a brighter aspect to the whole street? Central lighting concentrates the light just where it is least wanted, to the loss of the side walks and the edge of the roadway. With central lighting, everybody who seeks to enter or quit a conveyance must do so in shadow; which is a nuisance of no small magnitude. Mr. Baynes does not care much for prepayment electricity meters; and his Committee do not encourage their use. They do, however, believe in the maximum demand indicator, as an economical expedient for charging the consumer fairly for his share of the expense of "making ready." Altogether the newspaper story is reasonable and interesting enough; but there is nothing in it to alarm gas shareholders in the smallest degree.

There has been some discussion in Adelaide, South Australia, upon the thorny question of which system of street lighting is making most progress "at home"—electricity or incandescent gas-lamps. The question is purely of academical interest for Adelaide; seeing that the South Australian Gas Company have a four years' contract still to run with the Corporation. It is obviously impossible to answer such a query conclusively, unless its scope is clearly defined. Naturally, where local authorities have electricity supply undertakings of their own, they commonly like to do the street lighting in their chosen area, in order to start with a "nest egg" of trade. This gives a big spurt to the electric light, for the time being. It is, however, a line of business that does not, in the long run, pay either electric lighting local authorities or companies. The progress that has been made the last three or four years in the application of incandescent gas lighting to street-lamps, is far and away beyond the contemporaneous extension of public electric lighting in the United Kingdom. Town after town is giving in its adherence to the incandescent gas-lamp for public lighting; and when it is remembered that these lamps are applicable wherever gas is to be had, while electric lamps are of necessity restricted to the central compulsory areas of a statutory electricity supply, the failure of the latter to keep pace with the extension of the former is easily understood.

Thermo-Dynamic Problems.—We have received from the Technical Publishing Company, Limited, of Manchester, "The Theta-Phi Diagram Practically Applied to Steam, Gas, Oil, and Air Engines." It is the production of Mr. H. A. Golding, Assoc.M.Inst.M.E., the Chief Draughtsman to Messrs. Bryan Donkin and Co., and Assistant Lecturer at the South-Western Polytechnic, London; and the author states in his preface that he has attempted to "present, in as simple and practical a manner as possible, the use of the temperature entropy diagram, and the various methods of drawing it for heat motors."

THE WORKMEN'S COMPENSATION ACT.

COMMENTS which have appeared in some recent issues of the "JOURNAL" and correspondence in "The Times" have furnished evidence of the difficulties arising under the above-named Act. No sooner has the problem as to the necessity for taking out letters of administration before a legal receipt can be given for the compensation-money started on the road to solution than another presents itself. A manufacturer has in his employ a workman subject to epileptic fits; and he naturally wishes to know whether he can make any special arrangement with the man in regard to compensation for any accident that may occur as the result of this infirmity. The answer seems to be that, as the Act forbids "contracting out," the master, if he retains the man in his service, must bear the extra risk, or possibly get over his difficulty by paying a lower rate of wages in order to compensate him for the greater risk involved. But he may discharge the man; and should such a course be adopted in similar cases, it will lead to the gradual weeding out of those who are not absolutely fit, for few employers would be disposed to retain upon their premises workmen who might prove to be a constant source of trouble. In addition to the difficulties here referred to, others are presenting themselves to the various Insurance Companies. It appears that the Inland Revenue authorities are now claiming that the policies must bear a 6d. stamp if under hand only, and a 10s. stamp if under seal. Some of the offices are reported to be trying to evade this interpretation of the Stamp Act by putting on a penny stamp and writing over it. But it is questionable whether such documents are legal. This is another matter which will have to come up for definite settlement.

It was predicted of the Act that, whatever its shortcomings might be, it would be a good one for the lawyers; and the prediction seems to be in process of realization. At the same time, it must be acknowledged that the lawyers have been of material assistance, by means of the handbooks they have published, in throwing light upon certain obscurities of the Act. Proof of this is afforded by the fact that already some of these manuals have passed through several editions. And here it may not be out of place to notice the recent publication of the third edition of the useful little work by Mr. A. H. Ruegg, Q.C., on the Employers' Liability Act, 1880.* It was called for by the passing of the Workmen's Compensation Act; and the author has shown his appreciation of the importance of this measure by devoting the whole of the second part of his book to its consideration. The older Act, however, is dealt with as fully as in previous editions. He is careful to point out in his preface that, owing to the novelty of the principles on which the new Act is founded, the vagueness of some of the wording, and the absence of any judicial decisions, it has only been possible for him, while explaining the general provisions, to deal problematically with the difficult questions which so frequently present themselves. But, as might be expected, he has done this in a masterly way. The work possesses the merit of dealing with two important enactments affecting labour in a form which enables their respective provisions to be readily compared. The text is preceded by tables of statutes and cases, after the plan adopted in "Michael and Will;" and there is a good index.

THE GAS ACTS OF 1898.

(*Continued from p. 744.*)

The following Acts confer additional powers upon statutory gas companies:—

The Aberystwith Gas Act amends, and is to be construed with, an Act of 1873. It directs that before the expiration of seven years from the passing of the Act the Company shall discontinue the manufacture of gas on the existing site, and remove the works to the new site authorized to be taken for the purpose. At any time within thirty years, the Corporation may purchase the undertaking, after giving six months' notice to the Company, who are not to oppose the Corporation Transfer Bill except on details. The price is to be ascertained by arbitration; and the cost of removing the works is to be taken into account. The initial price for 15-candle gas is to be 4s. 3d. per 1000 feet.

The Enfield Gas Act extends the Company's district of supply, excluding portions of the parishes of Edmonton and Southgate from the district of the Tottenham Company, and transferring them to that of the Enfield Company. Additional lands are to be acquired. As from Jan. 1 next, all the shares in the existing ordinary capital of the Company are to be consolidated into ordinary 5 per cent. stock; and the preference stocks of the Company are to be similarly converted, and bear a uniform preferential 5 per cent. dividend. Unissued stock is also to be unified with the converted stock. Additional capital to the amount of £50,000 is authorized, to carry the usual borrowing powers. The sliding-scale is enacted, with the initial price of 4s. 6d. per 1000 cubic feet for 15-candle gas. Proceedings by the Company for the recovery of demands not exceeding £50 may be taken in the County Court. Except in the case of a Director retiring by rotation and offering himself for re-election, no proprietor is to be capable of election without 28 days' notice to the Secretary. Gas-pipes may be laid in undedicated roads. It is lawful for the Company to utilize their gas-mains for ancillary purposes. The Company may apply for an Electric Lighting Order; using their own capital for the application and for carrying into effect the Order, if granted. Prepayment for gas supplies may be demanded in certain cases. The period of error in defective consumers' meters is limited to the current quarter.

The Folkestone Gas Act empowers the Company to take additional land, subject to elaborate provisions respecting the displacement of persons of the labouring class. The Company are authorized to raise £130,000 of additional 7 per cent. capital, with the usual proportion of loan capital. The maximum price of 15-candle gas is fixed at 4s. 6d. per 1000 cubic feet. Gas-mains may be laid in undedicated roads.

The Gainsborough Gas Act authorizes the issue of £25,000 of additional 7 per cent. capital, to carry the usual borrowing powers. Borrowed money is not to be converted into capital at more than 4 per cent. The Company may apply for an Electric Lighting Order out of their own capital. Fifteen-candle gas is to be supplied, in place of the 10-candle quality authorized by the Company's Act of 1856. The Urban District Council of Gainsborough may take steps to acquire the undertaking within three years, without opposition by the Company; the price to be ascertained by arbitration under the Lands Clauses Act, including all expenses of winding up.

The Gaslight and Coke Company's (Capital Consolidation) Act has been summarized and described so many times in the "JOURNAL," that it need only be mentioned here for the sake of rendering our catalogue of Gas Acts complete. All the various preference stocks of the Company are converted into one 4 per cent. consolidated preference stock. The maximum stock is converted into 3¼ per cent. maximum stock. The "A" ordinary stock is converted into a new ordinary stock bearing 4 per cent. dividend. The debenture stocks are converted into 3 per cent. consolidated debenture stock. The sliding-scale is to operate on the ordinary stock in the ratio of 2s. per cent. per annum; and the maximum price charged to private consumers during any calendar year is to be taken as the price charged in such year. Clause 19 runs as follows: "Whereas the conversion by this Act authorized may affect the market prices of the Company's stocks, therefore be it enacted that, in the event of any purchase of the Company's undertaking by a public or local authority, the market prices of the Company's stocks shall not be taken into consideration in determining the price to be paid for the said undertaking." The costs of the Act are to be paid out of revenue.

The Gloucester Gas Act extends the limits of the Company to include several suburban parishes. Additional lands may be purchased by agreement; and the Company are authorized to construct or contribute towards the construction of railway sidings on the same. Immediately on the commencement of the Act, the Company are to transfer to the credit of their capital account the sum of £10,000, part of the sum of £13,720 4s. 2d. shown by the annual accounts of the Company to be standing to the credit of the profit and loss account after deducting the accrued dividend. This sum is not to be considered as capital entitled to dividend or available for distribution as profits. The share capital of the Company is to be consolidated into a uniform 5 per cent. stock. Additional capital to the amount of £70,000 is authorized, to carry the usual borrowing powers. Prepayment for gas supplies may be demanded in certain cases. The period of error in defective meters is limited to the last preceding quarter, unless it is proved to have occurred during the current quarter. Proceedings for the recovery of amounts under £50 may be taken in the County Court.

The Hartlepool Gas and Water Act only contains one clause relating to gas; and this makes the quality of the Company's gas 15 candles.

The Plymouth and Stonehouse Gas Act extends the district to the existing borough boundary, with a saving provision for the protection of the borough of Devonport: "Provided also that the Company shall not by any exercise of their powers in regard to the expenditure of capital or otherwise within the area added to their limits of supply by this section, either increase the price charged for gas within the existing limits of the Company, or prevent or hinder the reduction of that price under the provisions of the Act of 1894." The issue of £80,000 additional capital is authorized, to bear 5 per cent. dividend, with the usual borrowing powers. Additional lands, comprising the site of a certain tannery, are to be acquired by agreement.

The Southampton Gas Act extends the limits of supply of the Company, and regulates the price of gas at 3s. 6d. per 1000 cubic feet within the borough of Southampton and the Urban District of Eastleigh, and 4s. 6d. beyond. The charge is to be equalized within ten years, subject to the proviso that this process is not to be done at the expense of the inner district. Additional lands are to be acquired. A certain street may be widened, and another thoroughfare stopped. Works of distribution are to be executed under special clauses for the protection of the Southampton County Council. The existing capital of the Company is to be converted into stock bearing a

* "The Employers' Liability Act, 1880, and the Workmen's Compensation Act, 1897; with the Statutes Affecting these Acts, the Rules of Procedure thereunder, and Forms." By Alfred Henry Ruegg, Q.C. London: Butterworth and Co.; 1898.

uniform 5 per cent. dividend; and the old debenture stock is to be converted into a new 4 per cent. debenture stock. New capital to the amount of £200,000 is authorized, with the usual borrowing powers. Users of gas-engines are to fix anti-fluctuators if required. The gas is not to contain more than 22 grains of sulphur in winter, and 20 grains in summer, per 100 cubic feet. The period of error in defective meters is limited to the last preceding quarter. The Company are not to interfere with the bed and foreshore of the River Itchen.

The Southend-on-Sea Gas Act enables the Company to make and maintain a pier or jetty, with tramway connection with their gas-works. The ordinary capital is consolidated into 5 per cent. stock, with power to raise £100,000 additional stock. The loan capital is to be in the proportion of one-third of paid-up stock. The initial price of 4s. 3d. per 1000 cubic feet is enacted. The Company may apply for, and exercise, electric lighting powers, upon previously obtaining the consent of the Local Authority. The period of error in defective meters is limited to the current quarter. The buildings of the Company (not being dwelling-houses) are exempted from the Corporation Act. The Corporation may have the Company's accounts audited under the Board of Trade.

The Swansea Gas Act enables the Company to purchase additional lands by agreement. The capital is consolidated into 5 per cent. stock, increased by £120,000, with the usual borrowing powers. The price of gas within the extended borough is not to exceed 3s. 6d. per 1000 cubic feet. The reserve fund is not to be increased, nor borrowed money to be converted into share capital. The rate of interest payable on consumers' deposits is reduced to 4 per cent.

The Thanet Gas Act empowers the Company to acquire additional lands by agreement. The capital is to be converted into 3½ per cent. stock, with £80,000 additional, and borrowing powers to the extent of one-third of the paid-up stock. Fifteen-candle gas is to be supplied. The charge for gas furnished to the public lamps is to be 5 per cent. less than that charged for the time being to any private consumer.

The Tottenham and Edmonton Act converts the existing capital of the Company into "A" 5 per cent. and "B" 3½ per cent. stocks, with a new issue of £30,000 of 4 per cent. preference capital. The loan capital is to be in the proportion of one-third of the stock. Fifteen-candle gas is to be supplied, under restrictions as to sulphur impurity. The Company may apply for electric lighting powers, and (if granted) carry out the same with their own capital.

THE WINTER INSTRUCTIONS OF THE GAS REFEREES.

The "Notification" of the Metropolitan Gas Referees for the winter season was issued at the close of last week. It contains the usual intimation that the maximum amount of sulphur allowable in gas will be 22 grains per 100 cubic feet. Beyond this, the Instructions agree, in the main, with those issued in the spring, the chief portions of the text of which, with the appendices, were given in the "Journal" at the time. The directions as to the mode of testing for pressure were those previously in force; but they have since been revised, and certain alterations made therein. They now stand as follows:—

Testings of pressure shall be made at such times and in such places as the controlling authority may from time to time appoint. In order to make this testing, the Gas Examiner shall unscrew the governor and burner of one of the ordinary public lamps, and shall attach in their stead a portable pressure-gauge.

The gauge to be used for this purpose consists of an ordinary pressure-gauge enclosed in a lantern, which also holds a candle for throwing light upon the tubes and scale. The difference of level of the water in the two limbs of the gauge is read by means of a sliding-scale, the zero of which is made to coincide with the top of the lower column of liquid.

The Gas Examiner having fixed the gauge gas-tight, and as nearly as possible vertical on the pipe of the lamp, and having opened the cocks of the lamp and gauge, shall read and at once record the pressure shown. From the observed pressure one-tenth of an inch is to be deducted to correct for the difference between the pressure of gas at the top of the lamp-column and that at which it is supplied to the basement of neighbouring houses.

The pressure prescribed in the Acts of the three Metropolitan Gas Companies is to be such as to balance from midnight to sunset a column of water not less than six-tenths of an inch in height, and to balance from sunset to midnight a column of water not less than one inch in height.

In Appendix L to the Instructions—"The Gas Referees' One-Twelfth of a Cubic Foot Measure"—some few alterations have been made in the directions as to proving the meters used in the various testings.

The regulations are to come into operation at each testing-place as soon as the prescribed apparatus has been provided by the Gas Company, and examined and certified by the Referees. Until then, the Instructions for the winter 1897-8 are to be in force at each testing-place, and the testings are to be continued as heretofore.

Prevention of Rust on Metal Work.—A paste composed of 125 parts of lard and 20 parts of camphor, melted together, with the addition of a little acid, is stated to be a good preventive of rust. The objects are dressed with the paste, which is removed after 24 hours.

THE SECOND ANNUAL CONVENTION OF THE LEAGUE OF AMERICAN MUNICIPALITIES.

Last year we paid some attention to the First Convention of the League of American Municipalities, for the sake of the bearing of the proceedings of the convention upon contemporary questions of gas supply in the United States. It appears, from recent numbers of our American contemporary "Progressive Age," that this function has repeated itself during the first days of August this year, at Detroit, when a number of municipal magnates and officials "orated" to each other—apparently to their mutual gratification—upon a variety of subjects more or less connected with municipal government. The President of the congress was Mr. J. MacVicar, Mayor of Des Moines (Iowa); and the bulk of the membership, as at the first meeting, appears to have been composed of representatives of small communities. Still, it must be conceded that the interest of the population of a small town in such questions as the economic administration of gas supply is as great in proportion as that of large communities; while its manifestations are likely to be more practical and close to the facts.

At the first business session of the congress, Mr. James A. Lavery delivered an address on the "Relation of Municipalities to Organized Labour," in the course of which the speaker said some surprising things respecting the development of the municipal idea in other parts of the world. He informed his hearers that "the city of Birmingham, England, now owns and runs its street railways, gas-works, electric lighting plant, and water supply plant. It owns and operates a printing establishment and woolen (*sic*) mill. It runs its own pawnshops. In 1871, the city was the filthiest spot on earth. In that year municipal ownership began. To-day it is the cleanest and best governed city in the world." Truly, one must go from home to hear news. The speaker's object seems to have been to bespeak the favour of municipalities for Trade Unions. He was followed by Governor Pingree, of Michigan, who delivered himself of a somewhat superfluous argument designed to encourage extravagance in the American people, as a necessity for creating "business."

The next debate was upon the question whether municipal undertakings should be managed by boards, single commissioner, or council committees. A flood of talk was let loose upon this and kindred topics; and then Professor Bemis was allowed to descant upon the practical results of municipal administration of electric lighting undertakings. His statement was considerably involved; but he certainly did not make it appear that municipal electric lighting in the United States is cheaper than the same service in this country. Another speaker advocated the making of a charge by municipalities for "franchise rights;" and there was a vague discussion upon the cheapest way of converting private ownership of public undertakings into municipal proprietorship. Altogether, the proceedings were distinctly below the level of the previous year's transactions. The subject of gas supply was left out of the programme; and when the convention adjourned "without date," it must have been felt by those who had attended the meetings that the future of the United States would not be gravely prejudiced if the convention failed to meet again.

A COMPARISON OF THE HEFNER AND CARCEL LAMPS AS STANDARDS OF LIGHT.

The International Electro-Technical Congress which was held at Geneva in 1896, adopted the Hefner lamp as the unit of light. There was perhaps no very serious objection to be urged to this action, especially as the Hefner unit enjoys a very wide recognition on the Continent. But the congress went further, and expressed the opinion that the Hefner unit of light might provisionally, for industrial needs, be regarded as equivalent to the light of one *bougie décimale*, or one-twentieth of Violle's platinum unit of light. A protest against making the Hefner unit thus dependent on so uncertain a standard as Violle's unit, was raised to no purpose by the German delegates to the congress. That the protest was well founded is, however, shown by researches undertaken by M. Laporte, of which the results were presented to the Société Internationale des Electriciens, and were recorded in the "Bulletin" of that body. Most of these results were given, from that source, in tabular form, in the "Journal" for July 26 (p. 200). They have met with criticism from Dr. Hugo Krüss, in a recent number of the "Journal für Gasbeleuchtung;" and it may not, therefore, be inappropriate to refer at greater length to the methods pursued by M. Laporte, and to the more weighty conclusions which may be drawn from his results.

The carcel lamp is used almost solely in France; and it has hitherto been taken for granted in that country that its light is equal to 9·6 *bougies décimales*, while one Hefner unit is regarded as equal to 1·02 *bougies décimales*. The relation between the Hefner unit and the carcel, therefore, becomes: 1 Hefner unit = 0·106 carcel. M. Laporte obtained from the Imperial Physical-Technical Institute at Charlottenburg two incandescent electric lamps, which, under a current of given strength

and electromotive force, were certified to emit light equivalent to 10 and 16 Hefner units respectively. He compared these lamps working under the specified conditions with a carcel lamp, and found them equal to 0·92 and 1·51 carcels respectively. According to the ratio between the carcel and the Hefner unit quoted above, the lamps were, therefore, equivalent to only 8·7 and 14·2, instead of 10 and 16 Hefner units. It thus appeared that the assumption of the Geneva congress was quite unfounded, and of no service industrially. Either the light of the carcel lamp was not equal to 9·6 *bougies décimales*, or the Hefner unit was not equal to 1·02 *bougies décimales*, or both these ratios were wrong. As the *bougie décimale* is difficult of reproduction, M. Laporte next compared the lights of the carcel and Hefner lamps. He used as the standard of comparison an incandescent electric lamp of about 3·3-candle power. Five series of from ten to twenty readings were made with the Hefner lamp, and eleven series with the carcel lamp. The means of these readings were: Electric lamp = 0·341 carcel = 3·72 Hefner units, and consequently 1 carcel = 10·91 Hefner units, or 1 Hefner unit = 0·092 carcel. If we take the ratio between the English standard candle and the Hefner unit at the value found at the Imperial Physical-Technical Institute at Charlottenburg—viz., 1 English candle = 1·14 Hefner units*—M. Laporte's observations give the carcel lamp an illuminating value of 9·57 English candles, or very close to the value found by several earlier observers. For instance, the Dutch Committee on Photometry in 1894 found that the carcel lamp gave a light of 9·631 English candles; † Mr. W. J. Dibdin in 1885 found its mean value to be 9·4 candles; while Mr. Sugg, as early as 1870, had ascribed to it a value of 9·6 candles.‡ In the year 1896, MM. Durand and Jigouzo made researches which showed that the Hefner unit was equivalent to 0·93 *bougie décimale*, or 0·096 carcel, which ratio gives the carcel a rather lower value than that found by M. Laporte.

Experiments were made by the last-named observer for the purpose of ascertaining if the two carcel lamps in his possession fulfilled the conditions prescribed by MM. Dumas and Regnault in 1842—viz., that the consumption of pure colza oil should be 42 grammes per hour, with a permissible deviation of 3 grammes more or less, for which correction is made on the assumption that the intensity of the light varies with the consumption of oil; that the wick protrudes 10 mm.; that the shoulder of the glass chimney is about 7 mm. above the wick; and that the height of the flame is 40 mm. M. Laporte's lamps consumed more than 45 grammes of oil per hour, until he reduced the length of the protruding portion of the wick to 7 to 8 mm., but maintained the distance between the shoulder of the chimney and the wick at 7 mm. He then found that the consumption kept constantly between 41 and 43 grammes; and he used the lamps under these conditions in his researches. He gave great attention to the ventilation of the testing-room; for he observed that, though it had a cubical content of about 2900 cubic feet, a gradual diminution both of the oil consumption and of the light occurred. The light diminished by 12 per cent., and the oil consumption by 4 per cent., in half an hour; but a thorough renewal of the air restored the original state. Vitiation of the atmosphere was not, however, found to have so marked an effect on the carcel lamps at the central testing-bureau in Paris, and at the gas-works at Baudy.

M. Laporte also made comparisons of the Hefner unit and the German standard paraffin candle. He observed the height of the candle-flame by means of Krüss's optical flame measurer. It varied between 49 mm. and 52 mm.; but within these limits the illuminating value changed in proportion to the height of the flame. It was found that 1 mm. height of flame corresponded to a change in illuminating power of 2 to 2½ per cent. By means of this ratio, M. Laporte referred all the results of his observations to a flame-height of 50 mm. He found that observations made on the same day gave concordant results, but that the results obtained on two separate days frequently differed by as much as 7 per cent. The mean of all his observations gave 1·19 Hefner units as the illuminating value of 1 standard German candle with a 50 mm. flame. In Germany, the paraffin candle has usually been regarded as being equivalent to 1·20 Hefner units.

An American Gas Power Station.—A recent issue of the "American Engineer" contained a description of a gas power station using Indiana natural gas, which can be bought for 3½d. per 1000 cubic feet. The installation in question is at Lafayette, and the cost of fuel is only 22 per cent. what it was before gas power was installed. There are three units, each consisting of a 125-horse power engine belted to a 60-kilowatt dynamo. Two are so far at work. The dynamos furnish current for 40 enclosed arc and 1000 incandescent lamps, as well as for a 50-horse power rotary transformer. The gas-engines are of the Westinghouse type, guaranteed to do 125-horse power with not more than 14 cubic feet of gas containing not fewer heat-units than Pittsburgh natural gas. Their cylinders are 13 inches in diameter and 14-inch stroke; their speed being 265 revolutions per minute. About one-twelfth of a penny per horse-power-hour will be found possible with gas at 3½d. per 1000 cubic feet. Indiana natural gas yields 1050 heat-units per cubic foot.

* See "JOURNAL," Vol. LXII., p. 81. † *Ibid.*, Vol. LXIV., p. 1162.
‡ *Vide* "Practical Photometry," by W. J. Dibdin, p. 95.

THE ESTIMATION OF SULPHUR IN COAL AND COKE.

THE proportion of sulphur in coal is a matter of importance to the gas manager, but is of greater importance to the metallurgist. It is not, therefore, surprising to find that more attention is paid to the methods of estimating sulphur in coal and coke by metallurgical than by gas chemists. In place of the brief description of, or simple reference to, one method of estimating sulphur, which, by many writers on gas manufacture is deemed adequate treatment of the subject, we find exhaustive and critical monographs in the metallurgical journals. The manager of a large gas-works nowadays cares very little about the amount of sulphur in the coal which he carbonizes; for purification by bog oxide or Weldon mud is a very economical process. Consequently the methods of estimating sulphur in coal are not now closely studied by gas chemists. Moreover, when it is necessary to make such an estimation, time is seldom an important factor; and the old and reliable, though tedious, methods may be adopted. With the metallurgical chemist, the matter is otherwise. A coal is bought or rejected according to the result of the sulphur determination; and often the latter has to be carried out with considerable rapidity. Therefore we may expect to learn a good deal from metallurgists concerning the estimation of sulphur in coal and coke. If this estimation be not of very much value to the gas manager so far as the selection of coal for gas making is concerned, it should nevertheless help him to put a correct value on his coke. In fact, a few enlightened gas engineers do select coal for carbonization which contains but little sulphur—not in order to save the trouble and cost of the purification of the gas from sulphur compounds, but to produce a nearly non-sulphurous coke, which will realize a better price than ordinary gas coke. Unfortunately the method of carbonizing coal which prevails in gas-works is against the production of truly non-sulphurous coke, however good the coal from which it is obtained; and hence the majority of gas engineers are disposed to ignore the matter entirely. Probably between these extremes lies the path which the wise engineer will prefer to follow; and therefore a few comments, prompted by an article by Mr. G. L. Heath in "Industries and Iron," may be opportunely made on the methods of estimating sulphur in coal and coke.

It is essential that the coal or coke actually taken for the analysis be in a state of very fine powder. An agate mortar serves best for reducing small pieces of the material to this condition. The accuracy of the results depends to a very great extent on the fineness of the sample, especially when the simple fusion methods of determination are used. The old and reliable system of Nakamura is still employed by many eminent chemists; but it is slow, and needs much attention. The coal or coke is put in a platinum dish or crucible with about four times its weight of dry alkaline carbonates, mixed in their molecular proportions (13 parts of potassium carbonate to 10 parts of sodium carbonate). The dish is nearly covered, and gently warmed; and the heat applied is gradually increased until, at the expiration of about three hours, the dish is at bright redness. If the operation be hastened, vapours containing some of the sulphur will escape. On cooling, the mass is extracted with water, and the insoluble matter is filtered off. Usually a little bromine water is added to the filtrate—and the surplus bromine expelled by boiling—in order to oxidize completely the sulphur in it. Hydrochloric acid is then added, and the sulphate present is determined by precipitation with solution of barium chloride in the well-known manner.

A more rapid plan than Nakamura's is the fusion method, of which a good modification has been described by Blair.* About 1 gramme of the coal or coke is mixed intimately with 10 grammes of dry sodium carbonate and 6 grammes of dry potassium nitrate, and transferred to a platinum dish or crucible. The crucible is then covered and heated. The heat is gradually increased until the mass is in a state of fusion, when it is run over the interior of the crucible, which is afterwards allowed to cool. The melt is extracted with hot water, and the extract filtered. Very frequently the filtrate would then be acidified, and the sulphate in it determined in the usual manner. Blair, however, recommends that the filtrate be acidified with hydrochloric acid, and evaporated to dryness, in order that dissolved silica may be rendered insoluble. The residue remaining after evaporation of the liquid is treated with acidified water, and the extract is filtered; the sulphate in the filtrate being determined in the usual manner. This evaporation of the filtrate of the aqueous solution of the melt makes the method slow; and to shorten the time occupied, Blair recommends that the filtrate be acidified, ammonia added in excess, and the liquid boiled while a stream of carbonic acid is passed through it. The silica, alumina, &c., are thereby precipitated, and are filtered off; and the filtrate is acidified, and the sulphate in it determined in the usual manner.

The fusion method of determination is condemned by Mr. Heath, because of the long time occupied in evaporating the filtrate from the melt to remove silica from the liquid in which the barium sulphate is precipitated. He considers the removal of the silica absolutely necessary in order that the results may

* "Analysis of Iron," third edition (1896), p. 284.

Analyses of Coals.

Description.	Locality.	Percentage Composition, Ignoring the Sulphur.				Fercentage of Sulphur.			
		Moisture (at 105° C.).	Volatile and Combustible Matter.	Fixed Carbon.	Ash.	By Hundeshagen's Method, with Bromine as the Oxidizing Agent.	By Eschka's Method, with Bromine (A) and Hydrogen Peroxide (B) as the Oxidizing Agent.		By Fusion with Potassium Nitrate and Sodium Carbonate.
							(A)	(B)	
1.—Bituminous, clean lump	Ohio, U.S.A.	0·72	37·15	57·01	5·12	1·364	1·375	1·372	..
2.—Do., fine slack.	,, ,,	0·78	30·72	54·92	13·58	2·197	2·203	..	..
3.—Anthracite, clean lump	Penna., U.S.A.	2·47	3·00	88·80	5·73	0·551	0·529	0·545	..
4.—Bituminous, clean lump	W. Va., U.S.A.	0·62	31·28	62·67	6·03	1·068	1 063	..	..
5.—Do., fine slack.	,, ,,	0·75	29·64	62·75	6·86	1·635	1·637	..	..
6.—Grey, soft friable	Rhenish Prussia	2·72	23·03	6·41	67·84	1·540	1·480	..	..
7.—Bituminous, soft and a little shaly	Pleasant Hill, Iowa, U.S.A.	1·26	43·72	45·65	9·37	4·99	4·95	..	4·97
8.—Do., soft and weathered.	Pleasant Hill, Iowa, U.S.A.	1·85	42·90	45·97	9·28	4·88	4·76	..	4·89
9.—Black, jet, lustrous, vitreous	Spain or Bohemia	2·83	38·70	49·46	9·01	0·203	0·201	..	..
10.—Kerosene shale, greyish brown, woody pieces	New South Wales.	0·07	82·05	5·81	2·07	0·375	0·364	..	..
11.—Carmel, greyish	Hartley Vale, Blue Mountains, N.S.W.	0·07	81·37	5·32	13·24	0·41	0·43	..	..
12.—Lignite, brown lump	Kosten, Bohemia	8·17	44·14	39·14	8 55	0·967	0·966	0 923	0·968

be accurate; and he does not refer to Blair's scheme for avoiding the evaporation, and thus shortening the time spent on the determination. Hence his strictures of fusion methods *in toto* are not completely justified. The methods he prefers are the "sintering" or "ignition" processes, of which the best known is Eschka's. One gramme of the coal is mixed with a gramme of pure magnesium oxide and half a gramme of sodium carbonate; and the mixture is heated in a platinum dish (frequently stirred meanwhile). The heat is increased gradually, until at the end of fifteen minutes the bottom of the dish is at low redness. Ammonium nitrate is generally added during the ignition for the purpose of oxidizing the mass; but Mr. Heath prefers to add an oxidizing agent to the aqueous extract of the mass, and to boil the extract for five or ten minutes. The oxidizing agent he employs is saturated bromine water, of which about 15 c.c. are required. The extract after boiling is filtered, and the filter is well washed. The filtrate is then acidified, and the bromine driven off from it by boiling. The determination of the sulphate is then made in the usual manner. Hydrogen peroxide may be used in place of bromine water as an oxidizing agent; but the amount of sulphate in it must be first ascertained, and allowance made accordingly when computing the results. It is almost impossible to obtain hydrogen peroxide of a high degree of purity; and we quite agree with Mr. Heath that, in all such cases as that referred to, bromine water is the purest and safest oxidant.

A modification of Eschka's method, consisting merely in the substitution of potassium carbonate for sodium carbonate, has been proposed by Hundeshagen, who thought that sodium carbonate did not retain the whole of the organic sulphur in certain Bohemian brown coals. Mr. Heath investigated this point, and was unable to confirm Hundeshagen's view. The loss experienced by the latter, Mr. Heath is inclined to attribute to too rapid heating of the sodium carbonate mixture in a deep crucible. Mr. Heath prefers a shallow platinum dish for the operation. Several modifications of the above methods were tried in certain instances by Mr. Heath; but they appeared to have no sufficient advantage over the "fusion" or Eschka's system. He considers the ignition methods, such as Eschka's, far preferable to the fusion methods as rapid operations suitable for technical work. Precaution must be observed, however, when employing the ignition methods on samples of coal containing much iron pyrites or calcium sulphate, to boil the ignited residue with water for a longer time and to wash more thoroughly than is necessary in ordinary cases.

The above table gives the more important of the analytical results that were recorded by Mr. Heath. There are methods of estimating sulphur in coal in fairly extensive use to which Mr. Heath makes no reference. One that is often employed by colliery chemists consists in heating a mixture of the powdered coal with about twice its weight of pure caustic lime, in a porcelain crucible in a muffle furnace. The heating commences with the muffle at barely visible redness, and it is gradually increased to bright redness, at which it is maintained for about three hours. The residue when cold is extracted with water, to which bromine water is added to ensure thorough oxidation. After digestion for about twenty minutes, a slight excess of hydrochloric acid is added, and the whole is raised to the boiling-point to expel the surplus bromine. After filtration, the sulphate is determined in the filtrate in the usual manner. The lime used must be free from sulphur, or the amount of sulphur in it must be ascertained and allowed for. The method is convenient in that less attention is required than with many of the other methods; and the results are fairly reliable.

In all the methods in which the material is heated in an open dish or crucible, sulphur may be acquired by it from the gas-flame if gas is the fuel employed. Many analysts, including Mr. Heath, use a spirit lamp in place of a gas-flame for heating the crucible or dish in their sulphur determinations. Blair, however, considers this a needless refinement, provided care be taken that none of the fused mass flows over to the exterior of the crucible, and thus comes into direct contact with the gas-flame.* In laboratories where gas free from sulphuretted hydrogen, and containing only a few grains of sulphur compounds per 100 cubic feet is available, a gas-flame may certainly be used if ordinary care be exercised to avoid the licking of the material by the flame.

Attempts made to distinguish between the sulphur existing in the coal as sulphide, or as organically combined sulphur, and that present as sulphate, cannot be considered of much practical value. If the sulphur in the ash from a given quantity of coal is deducted from the total amount of sulphur in the same quantity of coal, the difference may fairly correctly be taken as the amount of sulphur existing as sulphide in that quantity of coal. The sulphur found in the ash is usually regarded as having existed in the coal as sulphate. If, however, the coal contains carbonates of the alkalies or of alkaline earths, these deductions will be incorrect.

Institution of Civil Engineers.—The meetings of the Institution will be resumed on Tuesday, the 1st prox., when the President, Mr. W. H. Preece, C.B., F.R.S., will deliver an address, and will afterwards distribute the medals awarded by the Council.

The New Physical Laboratory at Manchester.—The foundation stone of the new physical laboratory which is being built at Owens College, Manchester, was laid last Tuesday by Mr. Henry Simon, who has founded a German professorship in the college, and contributed liberally to the general funds. The laboratory has been designed by Professor Schuster.

Arithmetical Chemistry.—We have on previous occasions noticed the useful little book, bearing the above title, written by Mr. C. J. Woodward, B.Sc., Head of the Chemical Department of the Municipal Technical School, Birmingham. We have received from the publishers (Messrs. Simpkin, Marshall, Hamilton, Kent, and Co., Limited) a copy of the new edition, which contains additions in the form of laboratory hints and suggestions for experimental work as a basis for the lessons set. The author is careful to point out that experimental work alone is as useless as are mental exercises alone. His aim has been to induce students to think, and at the same time to find them something to think about. The latter object has been achieved; the former will be, by the use of the book.

The Regenerative System of Gas Lighting.—Notwithstanding the changes which have been witnessed of late years in systems of exterior lighting, it is interesting to find that regenerative gas-lamps are still largely employed, more especially for shop-fronts and railway stations. One type of lamp which has had signal success in these directions for some years is Fullford's wind-proof lamp, a new pattern of which is now rapidly making its way, under the auspices of the Lamp Manufacturing Company, Limited. It is of the dual form, and answers the purposes of illuminating and advertising. Two of the lamps are surrounded by one shade, which, having a good reflective surface, not only effectively lights the shop-front, but advantageously displays the written panes. With regard to the use of regenerative lamps for lighting railway stations, their value has, for some reason, been tardily recognized in England, though it has been appreciated in many parts of the Continent, where they have been successfully installed. Now, however, several of the English Companies are giving the Fullford windproof lamp an extended trial, notably the Great Eastern, the South Eastern, and the London and Brighton—the last-named Company having put up a considerable number at their London Bridge, Victoria, and Brighton Stations.

* *Ibid.*, pp. 284-5.

NOTES.

The Benier Gas Producer and Engine.

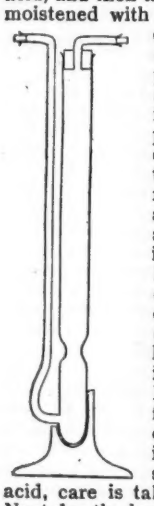
Prominence has been given by "Engineering" to a French type of combined gas generator and motor, called the "Benier" combination, which is being introduced into this country. For economical reasons, combinations of gas producers and engines have been more generally exploited in France than in the United Kingdom. In the Benier plant, the connection between the gas producer and engine is very close. The producer consists of a double cast-iron drum or cupola, lined with fire-brick. The fire-grate is a series of ribs cast on a rotating cylinder, in shape like a large cock-plug, which contains water. As the gas is generated from steam and air, it is drawn from the producer by a pump actuated by the engine. Thus it is supplied to the working cylinder at slightly below atmospheric pressure. Previously mixed with the regulated quantity of air, the fuel-gas charge makes one ignition for every revolution of the crank. This is effected by the following cycle: From the mixing chamber, the charge enters by a suitable valve into the working cylinder, just after the products of combustion of the previous charge have been expelled. The return stroke of the piston compresses the charge; but when the crank is just over the dead-point, it is electrically fired. Just before the piston reaches the end of its outward stroke, the exhaust ports are opened behind it, and the combustion gases are free to escape, which they do by the aid of a puff of fresh air sent after them. This scavenging cushion of fresh air is immediately followed by a fresh charge delivered by the pump. These engines are now being made up to 225-horse power; and one of the type is to be used in the next French Exhibition.

Gas-Engines for Dock Pumping.

Particulars have been published by the general engineering press of a new dry dock recently constructed at Limehouse, to the order of an old-established ship-repairing firm, Messrs. Fletcher, Son, and Fearnall. A high degree of interest attaches to civil and mechanical engineering work done for private firms, inasmuch as considerations of economy and efficiency may be supposed to weigh even more with them than with the public bodies and companies who usually require work of the kind. In the present example, an important feature is the employment of gas power to actuate the dock pumps. These are three in number, all centrifugal, two being 26-inch and the third 10-inch suctions. The selection of gas-engines for this purpose was due in the first place to considerations of economy; gas showing, according to "Engineering," an economy as compared with steam of over 4 to 1 as a practical result. There will be two large Crossley engines, each of over 40 nominal horse power, but working up to 137 indicated horse power. This plant is designed to pump out the dock, when there is no vessel in it, in 2 hours; or in half an hour less if a big ship is in place. The second reason for the use of gas power for pumping out the dock is its availability at any moment. Ship-repairing has nearly always to be done in a hurry; and it is a most important advantage to be able to start the pumps the instant after a ship is docked, day or night, in order to commence work with the least possible delay. The advantage of gas over steam power in this regard is obvious. In the present plant the gas-engines will not only pump out the dock, but will also drive a dynamo for lighting the establishment and actuating machine tools.

A Convenient Form of Drying-Tube for Gases.

At the recent meeting of the British Association, Mr. A. G. Vernon Harcourt, F.R.S., described a convenient form of tube for drying gases. A common method of performing this operation is to pass them through a wash-bottle containing sulphuric acid, and then through a U-tube filled with fragments of pumice moistened with the same liquid. The number of corks and connections in this arrangement increases the chance of leakage. The U-tube must be supported in an upright position, both when in use and afterwards, so that the acid may not come in contact with the corks. If too much acid is poured in, the bend becomes blocked by a plug of liquid. There are no means of telling when the acid has become less efficient by dilution; nor is it easy to re-charge the tube with fresh acid. The form of drying-tube shown in the accompanying diagram avoids these defects. It is at once a wash-bottle and a drying-tube. It has one cork, and stands upright. The pumice can be well drenched with sulphuric acid; the excess draining down and filling the lower part (through which the gas bubbles) to a convenient height. Dilution announces itself; and the acid is easily renewed. The shape is that of a Gay-Lussac burette with a constriction about 2 inches from the bottom. A piece of pumice, large enough to block the constriction, is first dropped in, and the tube is filled to near the top with small fragments of pumice. In charging with acid, care is taken not to wet the upper part of the tube. Next day the level of the acid in the lower part of the tube is marked with a strip of gummed paper. The small side tube entering the large tube near the bottom, is the inlet for the gas.



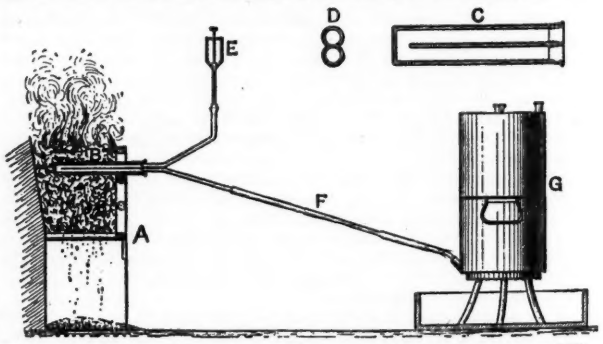
When the moisture absorbed has raised the level of the acid about 2mm. above the mark, the acid in the lower part is poured off through the small tube, and fresh acid is poured in through the pumice. The inlet and outlet tubes are made of the same height, so that a series of similar drying-tubes may readily be joined together.

Chemical Notes on the Drying of Linseed Oil.

Lippert, experimenting with oils and varnishes in order to observe the effect of the absorption of oxygen during the process of drying, finds that for boiled linseed oil the less drier used the better, whether the drier be a manganese resinate or lead oxide. After its application upon a surface, a coating of this kind increases in weight while drying. The higher the proportion of drier, the sooner is the maximum of absorption reached, and the sooner, also, the coating begins to lose weight again. Conversely, the smaller the proportion of the drier, the larger is the total weight of oxygen taken up. After four weeks, the varnish containing 2 per cent. of manganese had commenced to soften again, and stuck to the palm of the hand. The preparation containing only 0·15 per cent. of manganese was distinctly the best. With litharge also, the larger the proportion of drier the sooner the varnish attained its maximum weight, and the less total oxygen was absorbed. All the films were equally hard to the touch when they had reached their maximum weight; but after four weeks they softened again—this being more especially noticeable with the specimens containing much of the drier. Additions of litharge above 2½ per cent. made no appreciable difference to the absorbing power; while for practical work the proportion of the lead ought evidently to be kept lower than that permissible with the manganese salts. The reason why such coatings soften again after becoming dry is not yet known. It may be found to depend on the presence of an excess of drier, or of an unsuitable one. It does not prove adulteration with rosin or rosin oil. It may be due to oxidation of lead linoleate into a liquid turpentine-like body by prolonged exposure to the air. Science indicates no better way of testing a drying varnish than by the finger.

The Earliest Water-Gas Plant.

The earliest water-gas plant upon record was described in a paper bearing the somewhat enigmatical title "Factitious Airs," read by Sir Frederick Bramwell before the British Association in Bristol. This paper was a description of an enterprise started in Bristol in 1798 by Dr. Thomas Beddoes, styled the Pneumatic Institution, and having for its object the treatment of consumption and other diseases by the inhalation of various gases, then called "factitious airs." Some years previously, the firm of Boulton and Watt had made and sold apparatus for use in "pneumatic medicine." An illustrated pamphlet and price list of the apparatus, signed by James Watt, was published in 1796. From this pamphlet, the accompanying diagram is reproduced, slightly modified so as to show the arrangements for the production of the "hydro-carbonate" air. A is the furnace; B the fire-tube, shown enlarged at C, and in cross section at D; E is the arrangement for regulating the admission of water to the tube; and F is the connecting pipe, leading to the gasholder G.



The directions for preparing the hydro-carbonate air are: "Fill both cylinders of the fire-tube with small bits of charcoal, none of them exceeding a quarter of an inch cube; insert the water-pipe into the mouth of one of the cylinders, and the end-piece of the conducting pipe into the mouth of the other . . . . When the fire-tube has become perfectly red hot, admit water by the water-tube, pretty freely, in order to expel any noxious matter contained in the charcoal, and suffer any air which is thus produced to escape. When this part of the operation has been continued for five or ten minutes, restrain the water and bring the airholder into its place. With a proper degree of heat, and due exhibition of water, a 3-gallon airholder may be filled in half an hour without any steam passing into the conducting pipe." It is not recorded that anybody really died from this heroic treatment; but though the process was soon abandoned, and the Beddoes Institute closed, it had a most valuable by-product in the person of Humphry Davy, who was the assistant in charge of the gas-generating apparatus, and went from it in 1801 to become assistant lecturer at the Royal Institution. The interest of Boulton and Watt in this earlier gas-making apparatus may have predisposed them to look favourably upon the pioneer work of Murdoch in coal gas manufacture.

TECHNICAL RECORD.

A COMPARISON OF DIFFERENT SYSTEMS OF LIGHTING.

The last volume of Transactions of the Société Technique du Gaz en France contains an important communication by M. Bouvier, of Lyons, giving the results of investigations carried out by him to ascertain the comparative value of different systems of lighting. The results are presented in two tables, which are preceded by explanatory matter justifying the data taken by the author as the basis of his calculations. We reproduce the tables, and give a few of the author's examples of the application of the proportional numbers. We will suppose that it is desired to compare incandescent gas with incandescent electric lighting. In order to obtain the light of 1 carcel (9·6 candles), it is necessary to consume 0·018 cubic metre (0·63 cubic foot) of gas or employ 0·0375 kilowatt-hours of electricity; or, in proportional figures, for a given number of carcels there would be required 1 cubic metre (35·3 cubic feet) of gas as compared with 2·08 kilowatt-hours of electricity. Then what will be the price of one kilowatt-hour, with equal lighting, where gas is sold at 25 c. per cubic metre (5s. 8d. per 1000 cubic feet)? To equal 1 cubic metre of gas, 2·08 kilowatt-hours of electricity will be required; consequently, 1 kilowatt-hour will cost 12·02 c. If it is desired to compare a body of gas consumers of whom 25 per cent. use Auer burners and the rest flat-flame and argand burners, with another body using electricity in the proportions of 20 per cent. supplied to arc and the remainder to incandescent lamps, the latter will consume an average of 0·032 kilowatt-hour, and the former an average of 0·075 cubic metre for the production of 1 carcel. Assuming that the price of electric current is 1 fr. per kilowatt-hour, M. Bouvier shows that the gas consumers would not be paying more for the same quantity of light produced at 42 c. per cubic metre (9s. 6d. per 1000 cubic feet) than the electric current would cost at the above-named rate. In the case of a group of gas consumers of whom half use Auer burners, they would burn only about 50 litres (1·75 cubic feet) per carcel, and would get their light, with gas at

System of Lighting.	Normal Duty.			Product of Each Unit in Carcels.	Consumption Required to Produce 1 Carcel.	Numbers Proportional to those in Column A.								
	Consumption.	Lighting Value.												
		Carcels.	Decimal Candles.											
					(A)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9 & 10)	(11)
GAS—				1 Cb. Mt. =	Cub. Met.										
(1) Flat-flame burner	125 litres.	1·00	..	8·00	0·125	1	1·400	1·330	6·94	1·660	2·50	3·787	3·330	12·50	16·66
(2) Do., hollow-top (average)	..	..	..	11·10	0·090	0·720	1	0·960	5·00	1·200	1·80	2·730	2·400	9·00	12·00
(3) Fishtail, hollow-top, and Wenham burners, used by consumers in the following proportions: 50, 30, and 20 per cent.	150 litres.	1·60	16	10·64	0·094	0·752	1·040	1	5·22	1·250	1·84	2·850	2·500	9·40	12·50
(4) Auer incandescent burners (average*).	..	..	..	55·55	0·018	0·144	0·200	0·192	1	0·240	0·36	0·545	0·480	1·80	2·40
(5) Fishtail, hollow-top, Wenham burners, 75 per cent.; Auer burners, 25 per cent.	75 litres.	1·00	..	13·33	0·075	0·600	0·830	0·800	4·16	1	1·50	2·270	2·000	7·50	10·00
Fishtail, hollow-top, and Wenham burners, 50 per cent.; Auer burners, 50 per cent.	..	..	..	18·52	0·054										
(6) Fishtail, hollow-top, and Wenham burners, 40 per cent.; Auer burners, 60 per cent.	50 litres.	1·00	..	20·00	0·050	0·400	0·555	0·532	2·76	0·660	1	1·510	1·330	5·00	6·60
PETROLEUM—				1 Kilo=	Kilo.										
(7) M. Bouvier's trials in 1888	99 grms.	3·00	..	30·00	0·033	0·264	0·366	0·350	1·83	0·440	0·66	1	0·880	3·30	4·40
ELECTRICITY—															
(8) Incandescent system—				1 Kw-hour=	Kw-hours.										
3·75 watts per candle (average lamps and duration)	60 wt-hrs.	1·60	16	26·66	0·0375	0·300	0·416	0·400	2·08	0·500	0·75	1·136	1	3·75	5·00
3·50 watts per candle (good lamps, first 250 hours)	56 ,,	1·60	16	28·57	0·035										
(9) Arc system, lamps of 6 to 20 ampères	..	..	..	100·00	0·010	0·080	0·111	0·106	0·55	0·133	0·20	0·300	0·266	1	1·33
GAS—				1 Cb. Mt. =	Cub. Met.										
(10) Compressed	10 litres.	1·00	..	100·00	0·010	0·080	0·111	0·106	0·55	0·133	0·20	0·300	0·266	1	1·33
(11) Acetylene	7 to 8 ,,	1·00	..	125·00	0·0075	0·060	0·083	0·081	0·416	0·100	0·15	0·227	0·200	0·75	1

* The burner No. 3, introduced at the end of last year, gives a result 27 per cent. higher than the average here shown.

System of Lighting.	Unit Price.	Consumption (A) and Cost (B) per Carcel-Hour.		Numbers Proportional to those in Column B.								
		(A)	(B)	(1)	(2)	(3)	(4 & 5)	(6)	(7)	(8)	(9)	(10)
ELECTRICITY—												
(1) Incandescent lamps using 3·75 watts per decimal candle, excluding renewals	90 c. per kilowatt-hour	37·5 wt.-hrs.	3·375 c.	1	1·35	1·875	2·250	2·53	3·375	3·746	9·375	16·875
GAS—												
(2) Flat-flame burners	20 c. per cubic metre	125·0 litres	2·500	0·747	1	1·388	1·666	1·88	2·50	2·770	6·944	12·50
(3) Argand burners	,, ,,	90·0 ,,	1·800	0·533	0·72	1	1·200	1·35	1·80	2·000	5·000	9 00
(4) Various burners used by consumers in the following proportions: Flat-flame, 37·5 per cent.; argand, 22·5 per cent.; Wenham, 15 per cent.; Auer, 25 per cent.	,, ,,	75·0 ,,	1·500	0·444	0·60	0·833	1	1·13	1·50	1·666	4·166	7·50
ACETYLENE—												
(5) Gas produced with carbide at 60 c. per kilo.	2 frs. per cubic metre	7·5 ,,	1·500	0·444	0·60	0·833	1	1·13	1·50	1·666	4·166	7·50
PETROLEUM—												
(6) Oil of average quality	40 c. per kilogramme	33 grammes	1·330	0·390	0·53	0·730	0·880	1	1·33	1·460	3·660	6·60
GAS—												
(7) Present (1898) consumers, using 60 per cent. of Auer burners of recent types	20 c. per cubic metre	50 litres	1·000	0·296	0·40	0·555	0·666	0·75	1	1·110	2·777	5·00
ELECTRICITY—												
(8) Arcs of 6 to 10 ampères	90 c. per kilowatt-hour	10 wt.-hrs.	0·900	0·265	0·36	0·500	0·600	0·67	0·90	1	2·500	4·50
GAS—												
(9) Auer burners, consuming, on an average, 18 litres of gas per carcel, excluding renewal of mantles	20 c. per cubic metre	18 litres	0·360	0·1066	0·144	0·200	0·240	0·27	0·36	0 400	1	1·80
(10) Auer burners with compressed gas, excluding cost of compression	,, ,,	10 ,,	0·200	0·059	0·08	0·111	0·133	0·15	0·20	0·220	0·555	1

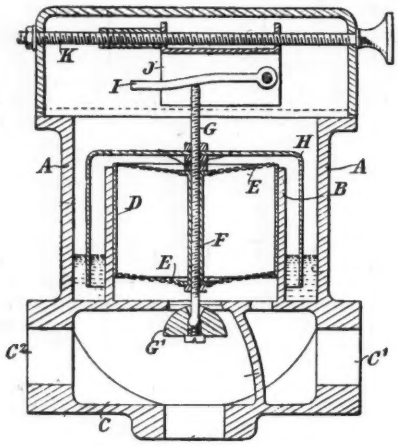
60 c. or even 64 c. per cubic metre (13s. 6d. or 14s. 6d. per 1000 cubic feet), at about the same cost as electricity at 1 fr. per kilowatt-hour—deducting renewal of mantles and maintenance of lamps. In his second table, M. Bouvier makes a comparison of the systems of lighting in use in Lyons, employing the rates of consumption contained in the first table. The price of electric current in the city is 1 fr. per kilowatt-hour; but in view of a reduction in the near future, the author took 90 c. The price of carbide of calcium is 60 c. per kilogramme retail, or 55 c. by taking 100 kilos. But here again a diminution in price is expected. According to Herr Bunte, acetylene cost, in the spring of 1897, 1 fr. 55 c. per cubic metre in Berlin; making the price of carbide 47 c. per kilo. Assuming that a system of lighting with Auer burners, as in example No. 9 in the table, costs 100 frs., what will be the cost of the same quantity of light obtained by the use of incandescent electric lamps? As the proportional figures for these two illuminants are 1 and 9·375, M. Bouvier shows that it would be necessary to spend 937 frs. 50 c.

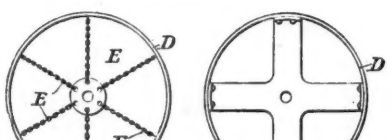
REGISTER OF PATENTS.

Service or Meter Governors.—Farmer, D. J. & S., of Elizabeth, N.J., U.S.A. No. 23,062; Oct. 7, 1897.

This invention relates to a gas-governor having inside a valve supported by radially extended chains connected to the stem; and it works without weights on the float to curtail the pressure.

The casing of the governor contains a tank A, with a cylindrical compartment B extended up from the bottom, where there is a valve-seat and an outlet opening. Below the casing is a compartment C for receiving the gas. This compartment is made with a wall separating the outlet C^1 from the inlets C^2 and C^3. Mounted within B is a cylinder D, which has





a series of radial flexible arms E projecting from it. These arms are connected to flanges of a collar F, surrounding the valve-stem G, which is screw-threaded throughout its entire length for engaging with nuts adapted to secure the collar F to the stem. Attached also to the stem G is a float H; and connected to the lower end of the stem is a semispherical valve G^1, with a socket for engagement with a ball forming part of the lower end of the valve-stem, and kept in contact with it, so that the valve is seated securely even though the governor may be slightly out of plumb. Resting upon the upper end of the valve-stem is a loosely pivoted swinging weight I, mounted on the spindle of an adjustable carriage J, susceptible of lateral adjustment by means of a screw K.

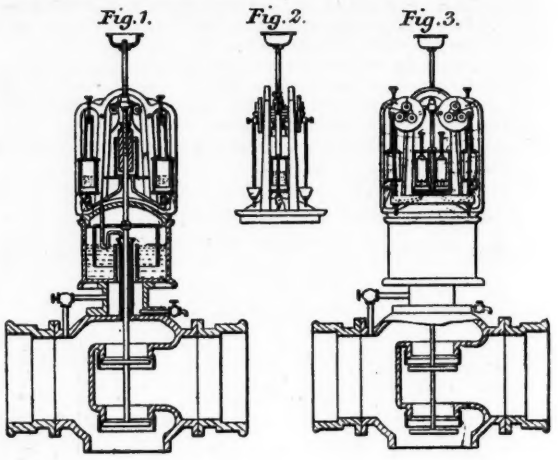
The gas enters at either C^2 or C^3, and thence passes up through the opening above the cone G^1, and through the outlet C^1. When the pressure is too great, the float is forced up to partially close the valve, whereby the pressure is reduced—the reservoir A being, of course, supplied with a filling of any suitable liquid for preventing the gas from escaping around the float. The object of the swinging weight I is to gauge the amount of pressure required to lift the float; and the weight can be adjusted for increasing or decreasing the leverage by turning the screw K in either a right or left hand direction.

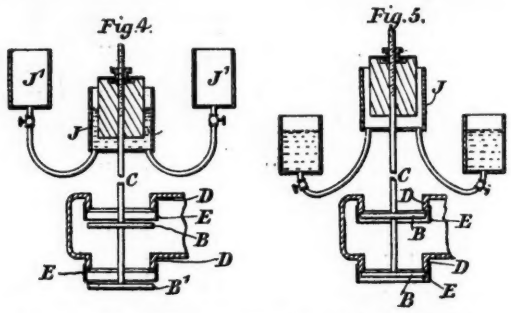
Differential Automatic Gas-Governors.—Farmer, D. J. & S., of Elizabeth, N.J., U.S.A. No. 23,063; Oct. 7, 1897.

In this governor "prompt automatic change of pressure" is said to be brought about, partly by means of an adjustable plunger located within the fluid receptacle, and partly by means of a compound valve-seat.

Fig. 1 is a vertical sectional elevation of the governor. Fig. 2 is an end elevation of the upper portion of it. Fig. 3 is a side elevation of the governor, illustrating a slightly modified form. Fig. 4 is a diagram (in section) of the valve and the fluid receptacles, illustrating the relative position of the parts when the valve is open; and fig. 5 is a similar view with the valve closed.

The body or base of the governor comprises a preferably globe-shaped casing, in which is the "compound valve-seat" forming part of the invention. The valve consists of two discs B and B^1, mounted upon a vertical rod C, and operated within downwardly projecting seats D, which form an integral part of the casing. Surrounding these seats are sliding collars E, adapted for adjustment vertically upon the seats for the purpose of controlling the gas supply by the valves being caused to travel downwardly to variable distances before the maximum supply is allowed to pass into the mains from the source of supply. Projecting up centrally from the upper wall of the casing is a tube through which the valve-rod C passes; and upon it is mounted a water-tank. Securely fitted to the upper edge of the tank is a dome or cover; and the operative mechanism of the governor is mounted thereon.





This mechanism comprises, primarily, fluid receptacles J and J^1 (designated "weight vessels"), adapted to receive the mercury for operating the device. Of the weight vessels, the centre one J is mounted upon the valve-stem C; and the vessels J^1 are suspended from cross-rods forming part of an arrangement of oscillating wheels—all located between uprights securely mounted on the dome of the tank. The vessels J^1 are preferably closed at each end; and they are suspended from the cross-rods by means of slotted hangers and adjusting screws threaded through the head portions of the hangers and bearing against the cross-rods, for the purpose of vertically adjusting them. The vessel J is open at its upper end, and has an adjustable plunger in it. The vessels J and J^1 are connected to each other by flexible tubes, with stopcocks for controlling the flow of fluid when desirable. The upper end of the valve-stem C is provided with a cup-shaped receptacle, adapted to receive weights for adjusting the apparatus. Weight receptacles or troughs are also suspended from the wheels, for a similar purpose.

In fig. 1 the governor is shown in position for day service, or when the minimum of gas is being passed through the valves to the street. It will be observed that the side fluid vessels are below the centre one. They contain all the fluid, and sustain the valves B and B^1 in their upward position, whereby a minimum quantity of gas is supplied to the mains. When the consumption increases, the pressure is reduced in the mains, which causes the float to descend by gravity. The weight fluid in the vessels J^1 then begins to flow to the vessel J, and the gradual change of weight causes the valves to descend, whereby an increased volume of gas is allowed to pass into the mains and the pressure is increased. The collars E, surrounding the valve-seats D, may be set so as to cause the valves to drop slowly for either a short or long distance before giving out the full volume or maximum supply of gas, whereby full weight pressure is not supplied to the mains until the valves are below the lower edges of the collars, as shown in fig. 4, and all the weight fluid is transferred from the vessels J^1 to the vessel J. The valve is then supplied with its maximum weight; and the full maximum pressure is delivered to the mains. When the consumption is diminished, the float begins to rise by the back-pressure in the mains, and the upward movement of the valves will be continued until the maximum pressure in them causes the valves to assume the position illustrated in fig. 5, whereby the minimum supply of gas is permitted to enter the mains, and the weight fluid is gradually transferred back to the vessels J^1.

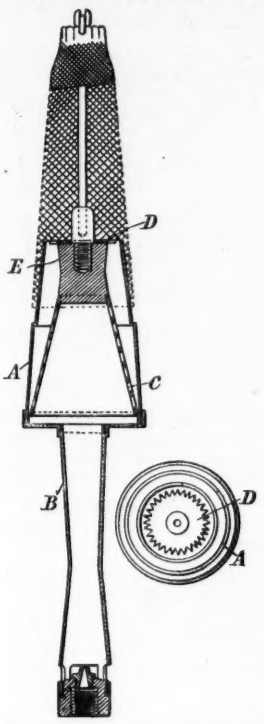
Manufacturing Acetylene Gas.—Sigurdsson, O. V., of Hammersmith. No. 23,351; Oct. 11, 1897.

In this acetylene gas-producing apparatus, the patentee proposes: "The combination with the gas-generating chamber of a calcium carbide supply chamber or hopper fixed to the head thereof; a feeding chamber at the base of the hopper communicating with the latter and with the gas-generating chamber; and a valve within such feeding chamber so

formed as, when slightly open to the gas-generating chamber, it shall also be open to the calcium carbide supply hopper—such valve being operated by a forked lever on its spindle and a stud carried by the gasometer."

Incandescence Gas-Burners.—Imray, J.; a communication from O. Kern, of Paris. No. 26,064; Nov. 9, 1897.

In patent No. 294 of 1897 [see "JOURNAL" for May 10 last, p. 1062] was described a form of incandescence gas-burner, the tube of which, instead of being of uniform diameter throughout its height, gently tapers to a smaller diameter at a constricted part about the middle of its height, and then gently tapers from the constricted part to a larger diameter at the top. According to the present invention, a tube of this kind is surmounted by a burner comprising an outer casing, an inner perforated shell, a boss thereon, and a disc having a serrated edge.

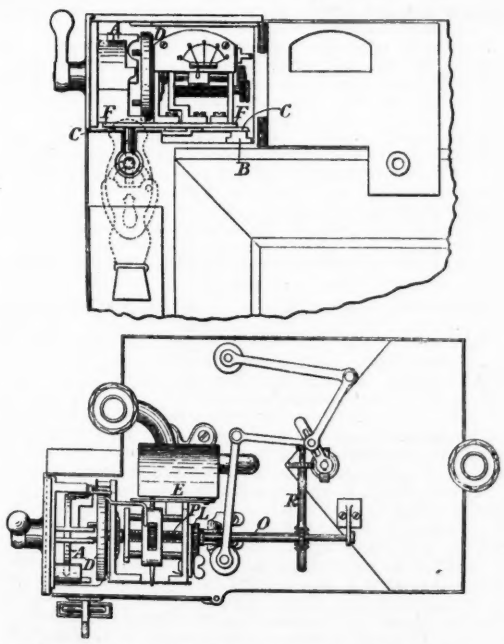


As shown, the taper casing A has a mean diameter about twice that of the upper mouth of the tube B; the height of the casing being about three-fourths of the total height of the tube. Within the casing is a taper shell C of thin metal (preferably copper), perforated with narrow and approximately vertical slits. The shell at its top has a diameter about equal to that of the upper mouth of the tube B. On the top of the shell is a boss E, on which is fixed a disc D, notched all round its circumference so that it presents the appearance of a toothed wheel—the teeth nearly covering the annular interval between the top of the boss E and the mouth of the casing A.

The air and gas admitted at the bottom of the tube B are thoroughly mixed as they ascend the tube and casing; and the mixture issuing through the perforated shell C, and then through the intervals between the teeth of the disc, and the annular space around them, when ignited "gives a flame having great intensity of heat, which, playing on a refractory mantle, will heat it to brilliant incandescence."

Coin-Freed Gas-Meters.—Nasmith, J., and Mercer, A., of Manchester. No. 2662; Feb. 2, 1898.

The object of this invention is to permit of the prepayment attachment being removed without any disturbance of the meter or of its case; so that it can be adjusted or corrected on the consumer's premises. The arrangement is described as applying to a meter such as that referred to in patents No. 2626 of 1891 and No. 387 of 1894; and the illustrations show a plan of the upper part of a dry meter with the prepayment mechanism in position, and a front view of part of the meter.



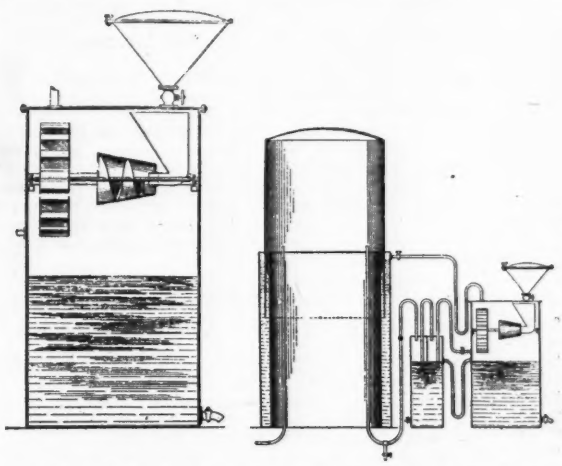
On top of the meter-case is fixed a plate B, having three projections formed on it, and bored and tapped for the reception of screws. To the plate is screwed a base-plate C; and to the latter is attached the valve-box E by a screw. The box is divided into two compartments by a transverse diaphragm, as described in the 1891 patent; the valve-seating surrounding an orifice in the diaphragm being attached to it. Inlet and outlet pipes are connected to the upper and lower compartments of the valve-box, and to the measuring portion of the meter. The valve-box is closed by a cover soldered in position. The valve is suspended (as described in the patent of 1891) on the end of a lever fixed on a spindle passing through the stuffing-box in the side of the valve-box, and connected with the link by which the position of the valve is controlled.

The prepayment mechanism is substantially similar to that described in the earlier patents; but some modifications have been made in its construction. For instance, the disc D, which is operated by the penny when held in the coin-receiver A, is now fixed on the screw spindle P, instead of on a separate spindle connected to the screw by gearing. To the underside of the frame F is fixed a projecting piece or bracket, in which is a threaded eye; and the front of the meter-casing is cut away to permit the easy passage of the eye when the prepayment mechanism is being withdrawn or placed in position. When the mechanism is in its working position, the door is closed; and the shank of the staple is screwed into the eye and tightened up.

For altering the change-wheel mechanism, there is a wheel mounted on the end of the long pinion, and driven from the pinion L; the carrier being borne in a quadrant, which can be set as desired. The spindle O has fixed on its inner end the pinion L, and is actuated from the spindle R, by means of which the index is driven. When the mechanism is withdrawn, the spindle O is held in position by brackets fixed respectively to the plate C and the meter-case. The change-wheel can be altered as desired, and the carrier again put into gear with it, while the prepayment mechanism is withdrawn; but when it is restored to its working position, the wheels easily fall into gear. The wheel L is fixed on O, and, gearing with the carrier wheel, thus rotates the pinion at a speed proportionate to the speed of O and the ratio of the two wheels.

Producing Acetylene Gas.—Strode, W. W., and White, G. H., of Osnaburgh Street, N.W. No. 11,161; May 16, 1898.

In carrying out this invention, a wheel is provided so formed (as shown) that it may be turned by water. It is operatively connected to a carbide-feeding device so constructed that it conveys the carbide in lumps or powder, without any tendency to become clogged or stopped. The device consists of a hollow rotatable vessel or chamber, preferably cone-shaped, part of which is divided internally into a spiral passage. The carbide is introduced into the vessel from a hopper or other receptacle, the end of which projects some little distance into the smaller end of the cone, in order that the carbide may, as far as possible, be kept away from the junction of the cone and hopper (at which point it would cause considerable friction). The conical shape of the vessel, the patentees remark, also contributes to this end. The vessel is revolved by the water-wheel; and the carbide slowly passes along the spiral passage, until it drops out into water below it.



The apparatus is preferably mounted on the upper portion of a vessel, the lower part of which serves for holding the water into which the carbide drops. The water operating the wheel falls into this vessel, and thus tends to replace the water absorbed by the carbide.

The gas is led away, by preference, to a holder similar to that described in patent No. 6658 of 1897 (see "JOURNAL" for March 22 last, p. 649); the water displaced by the holder being used to operate the wheel. Thus "the quantity of water, and the quantity of carbide delivered by its means, will be proportional to the displacement of the holder, which in its turn depends upon the amount of gas consumed."

The receptacle for the carbide is preferably made in two portions, one inside and the other outside the vessel already described. The two sections communicate with each other; but they are so arranged that, upon opening the outer one for recharging or other purposes, communication between the two parts is cut off. This is so as to prevent access of air to the vessel containing the gas, and thus obviate danger of gas escaping from the vessel.

Using Calcium Carbide for Generating Acetylene.—Dillberg, G., of Sydney, New South Wales. No. 15,214; July 11, 1898.

This invention, says the patentee, is designed to obviate the necessity of employing any mechanical devices in the generation of acetylene from calcium carbide, and, says the patentee, "to minimize to almost prohibition" the choking of any passage or burner through which the acetylene has to pass before being combusted.

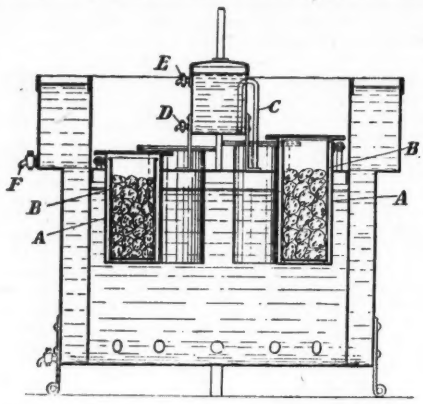
To accomplish this object, he proposes to employ an envelope of some porous material—such as canvas, calico, wire gauze, or the like—shaped as a bag, cylinder, or otherwise, as may be desired, in which carbide may be placed. Thus enclosed the envelope is immersed in water, which penetrates into the interior of the envelope, acts upon the carbide, and evolves acetylene. "The bubbles thus formed naturally endeavour to rise to the surface of the water; but by this method they encounter the

resistance of the porous material confining the carbide. Thus obstructed their filmy coating bursts, and liberates the gas, which is then permitted to pass through the pores into water where it rises to, and above, the surface in a highly purified condition, while the film with which the bubble was coated is retained in the envelope, and the surplus carbon is retained in the water." By this means it is claimed that the gas reaches the burners in a pure state; thereby prolonging their lives very considerably, while the offensive odour of the gas is greatly minimized.

Acetylene Gas-Generator.—Dant, H., of Nuremberg, Germany. No. 16,090; July 23, 1898.

The patentee employs a reservoir arranged in, and fastened to, the bottom of a cistern, and closed at the top by a cap; the lower part being provided with holes allowing water to pass to the interior from the cistern. In the cap are a series of air-tight cylinders A, which contain calcium carbide vessels B. The cylinders are furnished with cocks serving for the inlet of water and the outlet of gas; and each one differs from the others in that they are at various heights or points above the water-level. By this arrangement, one cylinder comes in operation at the time when the lower-lying one has been flooded and has finished its operation—*i.e.*, when all its carbide is converted into gas and is submerged.

In the middle of the cap is a cleaner or cooler C, communicating with the main reservoir by a syphon-tube, and having two cocks, D E, of



which the former serves for the water-outlet and the latter for controlling the level of the water in the cleaner.

When the apparatus is not in operation, the main vessel is filled with water up to the cock F; the carbide cells are charged; and the cylinders A closed. Water is allowed to pass in until all the carbide cylinders are submerged, and the pressure drives the water into the lowest-lying cylinder, and gas is generated. When the development of gas is proceeding, it forces the water into the main reservoir, whence it is forced into the cleaner or cooler C. When the contents of the first cylinder are completely converted into gas, it is filled with water by the pressure in the cistern; and after this the water ascends to the cock of the cylinder lying next higher than the first one, in order to cause the generation of gas in it, and so on to the last cylinder.

APPLICATIONS FOR LETTERS PATENT.

20,317.—Louden, W., "Boiling and grilling attachments for cooking ranges." Sept. 26.

20,342.—Ricaris, C. de, "Manufacture of a carburet compound and of an inflammable gas therefrom and apparatus therefor." Sept. 26.

20,430.—Dillberg, G., "Acetylene gas generator." Sept. 27.

20,451.—Dymond, J., "Gas-producers." Sept. 27.

20,453.—Bower, G., "Regenerative lamps." Sept. 27.

20,468.—Thwaite, B. H., and Allen, H., "Generating acetylene gas from calcic carbide." Sept. 28.

20,488.—White, J., "Simplicity atmospheric gas-making machine." Sept. 28.

20,524.—Mills, B. J. B., "Improvements in means for lighting incandescent and other gas-burners provided or not with chimneys." A communication from P. Bardot. Sept. 28.

20,541.—Poerschmann, F. B., and Schneider, H., "Acetylene generators." Sept. 28.

20,580.—West, J., "Conveying coke and other materials." Sept. 29.

20,605.—Chandler, S., jr., & J., "Acetylene gas-lamps." Sept. 29.

20,626.—Crees, G. W. B., "Generator of acetylene." Sept. 30.

20,646.—Abeles, R., "Carbide and acetylene gas apparatus." Sept. 30.

20,700.—Potter, W. G., "Valves applicable to gas, steam, and water service." Oct. 1.

20,722.—Colohan, J. F., "Acetylene or other gas-lamps." Oct. 1.

20,740.—Thompson, W. P., "Incandescent mantles." A communication from O. Lenz. Oct. 1.

20,750.—Post, W., "Controlling distant gas-burners." Oct. 1.

20,756.—Schultz, K., "Incandescent burners or lamps." Oct. 1.

Gas "Boycotted" at Barcelona.—According to a telegram received through Reuter's agency, the shops of Barcelona are lighted by other illuminants than gas, owing to a dispute between the consumers and the Gas Company, which has reached an acute stage.

Reductions in Price.—The Southwold Gas Company reduced the price of gas, as from the 1st inst., from 5s. 10d. to 5s. per 1000 cubic feet. The Sleaford Gas Company, Limited, announce that, as from the quarter commencing Jan. 1, 1899, the price of gas will be reduced from 3s. 9d. to 3s. 4d. net per 1000 cubic feet, and that all discounts will be abolished. The Lighting Committee reported at the last meeting of the Higham Ferrers Town Council that the Gas Company had reduced the price of gas to 2s. 8d. per 1000 cubic feet, which was 5d. less than last year.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Origin of Gas Associations.

Sir,—Your "Notes from Scotland," in this week's "Journal," have drawn my attention to Mr. Myers's letter in your previous issue, which I had not before observed.

I was taken quite unawares when asked by the Secretary during the progress of the dinner at Duns to propose "The Waverley Association of Gas Managers." During the short time which elapsed before I was called upon by the Chairman, it occurred to me as being most appropriate to the toast to make reference to the unique position of the "Waverley" as being the pioneer Association. The story told on the spur of the moment was frank and open—just as it stood out in bold relief as imprinted on my memory "in life's young day," all too familiar to require any preparation on my part for its correct rehearsal.

Dates are at all times difficult things to remember; but, though the exact date is obliterated from my memory, I remember quite clearly that it was in the season of the long days. After the meeting and dinner in the Queen's Head Hotel, Kelso, Mr. Clazy, the newly-elected President, took the company (along with their wives) around the town and through the grounds of Floors Castle on a beautiful summerlike afternoon.

The late Mr. Robson, of Selkirk, who formally convened the meeting, may have been right or wrong as to the precise date; but of the fact of my promptly communicating the formation of the Waverley Association to my friend Mr. Mackenzie, prior to the formation of the Association Mr. Myers refers to, there is in my mind no manner of doubt. Nor is this version of the origin in any way inconsistent with the story of Mr. Myers, which quite fits in alike with the subject of their conversation at the preliminary meeting in Cupar, and with the course pursued in the formation of this second Association on the lines which had been previously communicated to Mr. Mackenzie.

Airdrie, Oct. 8, 1898. James C. Adamson.

Coke Manufacture by Coke-Ovens in Lancashire.—The Duke of Bridgewater's Trustees are now expending between £30,000 and £40,000 in establishing at Greenheyes, near Bolton, plant for the manufacture of coke and residual products by means of coke-ovens. The Trustees are having put down a battery of 70 ovens; and it is expected that, when the new industry is fully established, it will find employment for close upon 200 workpeople.

Unaccounted-for Gas at Darlington.—The Gas Engineer of the Darlington Corporation (Mr. T. Smith) was recently requested by his Committee to report upon the question of unaccounted-for gas. As a result he finds that the figures relating to Darlington are below the average of nine neighbouring towns. At the same time, he points out that the principal causes contributing to the loss of gas are defective mains and services, public lamps consuming more than the regulated quantity of gas, faulty registration of consumers' meters, and the somewhat leaky condition of the two oldest gasholders. With regard to the measures to be taken to reduce the percentage of waste, he recommends that the following course be adopted: (1) The testing of a number of the public lamps to ascertain the consumption of gas; (2) the testing of consumers' meters in all cases where they have been in use for a period exceeding five years; and (3) the recrowning of No. 2 gasholder. These proposals have been adopted.

Acetylene Gas and Plant Life.—An inspection of the installation of acetylene gas which had been introduced into the plant-houses of the Botanical Gardens, Edgbaston (primarily for the purposes of a garden party given to the United Kingdom Band of Hope Conference, and also at the close of the garden party given to the Sanitary Institute Congress) took place on the 30th ult. There was a large attendance of members of the Botanical and Horticultural Society and others, and the various demonstrations and explanations which were given were listened to with much interest. In the course of the evening, the Hon. Secretary of the Gardens—Professor Hillhouse—took the opportunity of saying that, in the interests of the Society, he had studied the light from two points of view—injury to plants from evolved gases, and relations with colour. He had gone through the houses with the utmost care, and had failed to see the smallest sign of injurious effect resulting from the use of the gas; while the most critical colours, so far as artificial illuminants were concerned, came out of the ordeal with success.

Llanelly Gas Company.—This Company, writes a local correspondent, have had some hard luck during the last few months. It was hoped that the new Manager (Mr. A. R. Cawley) would be able not only to reduce the price of gas to consumers, but also succeed in getting a better dividend for the shareholders. In March last, however, a strike with the men resulted in some loss to the Company; and the second and more serious struggle which took place early in September has no doubt cost the Company a considerable sum. It is not yet known whether the District Council will try to enforce a claim to which they think they are legally entitled for the gas-lamps not being lighted in the streets for nearly a week; and the penalty, which they estimate at the rate of £2 per lamp per night, amounts to above £5000. Meanwhile, Mr. Cawley has succeeded in making a dividend of 2½ per cent. for the half year ending June 30; and it will be acceptable to the shareholders, for they have had very little during the past four years. The half-yearly meeting was held last Wednesday, when it was reported that some of the retort-settings were being converted from direct to gaseous firing; and it was anticipated that by this means a considerable saving would be effected. At a meeting of the District Council yesterday week, Mr. J. A. Williams moved that the Council make inquiry of the Gas Company as to their being prepared to negotiate for the sale of the works, and as to the possible cost of acquiring them. In support of the motion, Mr. Williams contended that, under good management, the gas supply should prove a profitable business. The tendency throughout the country was for the municipalization of such works; and there was no reason why municipalization should not be adopted in Llanelly. After some discussion, the motion was defeated by six votes to four.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. J. Blacket Gill in the chair.

The Secretary (Mr. H. D. Ellis) having read the notice calling the meeting, the Directors' report and the accounts—the chief portions of which were published in last week's issue—were submitted.

The Chairman, in moving the adoption of the report and accounts, said the Directors were always pleased to meet the proprietors, because they received them with much kindness; but on this occasion perhaps the pleasure was enhanced by the fact that they had a particularly good report and statement of accounts to present. For the first time for a long while past, they had been able to earn the very satisfactory dividend of 13½ per cent. on the old stock, and 10½ per cent. on the new stock, and to carry forward something like £1500 for the benefit of next half year; and, he was bound to say, they might want it. Proceeding to call attention to some of the principal items in the accounts, he said that coal had cost £1400 less than in the corresponding period of last year; and wages had decreased by £2826. The total cost of the manufacture of gas showed a diminution of £3484, which was particularly satisfactory. The sale of gas had brought in £3230 more; and the meter-rental an additional £833. But, he was sorry to say, the residuals came out about £630 less. It had cost them £137,789 to earn £191,748—the balance, £53,958, being £6731 more than this time last year, which, as he had said, enabled them to declare the handsome dividends of 13½ and 10½ per cent. The increase in the consumption of gas for the second quarter of the half year was at the rate of nearly 5 per cent.—to be exact 4·82 per cent.; but, over the whole half year, the increase had been 2·19 per cent. When he reflected that The Gaslight and Coke Company simply showed an increase of 1·6 per cent., and the South Metropolitan Gas Company (who, of course, had a better district than they had) an increase of 4·8 per cent., he thought their own figures were very satisfactory. He should state that of the increase 14,162,000 cubic feet were contributed by the coin meters. This, too, was a figure upon which they could dwell with pleasure. He was sure that during the late tropical weather this poor man's friend—the coin meter system—must have been an inestimable advantage. Altogether they had nearly 9000 of these meters out in their district, and about 9000 stoves, which, he should think, ought to have some effect upon the atmosphere of this rather gloomy London by not having so many coal fires throwing off smoke. Having mentioned that the new sulphuric acid plant was now at work very successfully, and had produced some profit this year, the Chairman said he had no doubt that some of the proprietors had read a long article in "The Daily Telegraph" on "The Light of the Future," in which it was stated, with some show of certainty, that all the streets of London would be lighted by electricity. He thought that perhaps the Company were singularly fortunate in their district, because he did not think they had very much money there to spend upon a luxury like the electric light; and he believed it would be some time before it would encroach upon them. Even if the electricians did come—and they did make efforts every now and then to light their streets—with the constant increase in the coin meter system, he did not think they could do the Company any harm. The Board had spent a considerable sum this last year or two upon water-gas plant. The proprietors were aware that they had to produce gas of 16-candle power; and he had ventured several times to speak of the extreme waste and folly of having to do so. But they had to do this according to their Act of Parliament; and, therefore, it was absolutely necessary they should use some enrichment process. They found that water gas was a decidedly convenient adjunct; and they had plant in operation at Poplar, and were just about getting another to work at Wapping. There was no doubt water gas was a great advantage and convenience to gas companies, because anything that tended to cheapen the supply or manufacture of gas must be a good thing to the consumers at large. A Departmental Committee were sitting to inquire into the question of the supply of water gas; and he would now therefore merely allude to the matter in this way: That water gas, as they used it, mingled with coal gas, was not a bit more dangerous than coal gas alone. Coal gas was particularly dangerous if one chose to leave a gas-tap turned on in a bedroom at night time. Anyone sleeping there would be dead by the morning; and exactly the same would happen with water gas. Then, again, what more dangerous method of lighting could there be than the petroleum lamps, about which they were constantly reading in the newspapers? The electric light, too, might be regarded as by no means a safe one; and so he claimed for gas that it was the safest light in existence. He regretted to say that they would have to pay a good deal more for coal this half year than last. The unfortunate strike in South Wales had no doubt caused the price of coal in the North to increase considerably. It had always been the practice of the Board to make their contracts about May or June; but this year, knowing that the strike was coming on in the early part of the year, they did not take any steps, as they hoped that it would soon be over. But such was not the case. The consequence was that, when they went into the markets to make their contracts in June, they found they would have to pay more than last year. This was an unfortunate circumstance. But it was a matter over which they had no control; and they must therefore put the best possible face on it. On the other hand, it was probable they would get some compensation by obtaining much better prices for coke and sulphate of ammonia; and tar also seemed likely to rise. They were not alone in this respect, because other gas companies had also had to pay higher prices. At the same time, it was a little unfortunate. There was another question with reference to the capital; but he would defer speaking about it until the resolution he had proposed was passed.

The Deputy-Chairman (Mr. W. G. Bradshaw) seconded the motion, which was at once unanimously adopted.

On the proposition of the Chairman, seconded by the Deputy-Chairman, dividends were declared of 13½ per cent. per annum upon the old stock, and of 10½ per cent. on the new stock, both less income-tax.

The Secretary then read the resolution referring to the raising of further capital. The first section was as follows: "That the Board of Directors be and are hereby authorized, in exercise of the powers conferred by the Commercial Gas Act, 1875, to raise the sum of £75,074, by the issue of new ordinary stock to the amount of £37,537, such stock to be denominated new stock, and by the issue of debenture stock to the amount of £37,537, such debenture stock to bear interest at the rate of 4½ per cent. per annum; and that such new stock and debenture stock shall be offered at par among the respective proprietors of ordinary, new, and preference stocks, in rateable proportion to the amount of stock appearing by the register of the Company to be held by such proprietors respectively at the dates of such offers, but so that no offer or apportionment of such new stock or debenture stock shall be of any fraction of £1 sterling." The second part of the resolution provided for the disposal of stock not taken up and paid for within the time limited by the Board.

The Chairman said the Directors were simply asking the proprietors to give them the power to issue this stock. No date had been fixed for its issue; and they would certainly have quite a month's notice when the Directors thought it advisable to raise some of the money. The proprietors were all no doubt aware of the circumstances of this issue. Under their Act of 1875, they had the power to issue to them this stock at par; and the power had been exercised on several occasions previously. From a shareholder's point of view, stock which stood at a large premium in the market allotted to them at par was particularly agreeable, but probably from the Engineer's point of view it was not so, because he was now working on capital upon which they were paying 7½ per cent.—that was on the stock issued last time; and he had to compete with companies who were getting their money at between 3 and 4 per cent. Therefore the Commercial Company were somewhat handicapped in the race. He did think an immense amount of credit was due to their Engineer for having submitted to this so long, and for having given them such good dividends, while he had been working with capital at a higher rate of interest than his neighbours. The water-gas plant, another purifying-house, and other appliances connected with their works rendered it absolutely essential that they should raise further money in the near future; and therefore it was that the Directors now asked for this authority. Take, for instance, the coin meters. These were making a large demand upon their capital. As he (the Chairman) had already stated, they had 9000 fixed, which meant a considerable amount of money; and, under present circumstances, they did not get anything like an adequate return for the interest they had to pay on the capital spent on them. But they put by a certain sum every year for depreciation of these meters; and, as years rolled on, and they got their money back, the business would be even more prosperous than it was now. He wanted to say a word or two in the way of a hint as to the new stock. This stock was really a fine bonus for the shareholders to put into their pockets. He believed theirs was the only Company that had such a chance. As he had already told them, they were going to work with rather dearer coal; and things might not be quite so prosperous with them. He said they *might* not be; not that they *would* be. However, there might be a difficulty in declaring the full dividend they had had for a good many years past. But there would not be much difference one way or the other, because they had a modest reserve to fall back upon. Issuing the new capital at par to the proprietors was equivalent to receiving a good dividend for some years to come; and he wanted them to bear this in mind, in case in future it should be inexpedient to declare quite the full dividend. He asked them not to depart with the idea that he was giving way to any gloomy prognostics. He had no idea of doing so. His opinion was that the Company were in an admirable position. Some words which Mr. Livesey used at the meeting of the South Metropolitan Gas Company had struck him as being very true. Mr. Livesey said: "The shareholders of a gas company required to look at things in rather a broader spirit than a simple question of dividend." He quite agreed with that; and he wished the proprietors to do so too. It was the last thing in his mind to say anything in depreciation of the Commercial Gas Company. They had had an excellent past; and he saw no reason why they should not have a fine future before them. He concluded by moving the adoption of the resolution.

The Deputy-Chairman, in seconding, said he should like to emphasize what the Chairman had said at the beginning of his speech—that the Directors had not come to any determination when this stock should be issued. He hoped this was fully understood. It was to the interest of the Company to put off what was a good day for the shareholders, but an evil one for the Company—to defer issuing the stock as long as it was reasonably possible to do so.

The motion was unanimously carried.

Mr. George Livesey said the last six months had been an anxious time; and there were anxious times still before the Directors. It was therefore more than ever necessary that the Board should have the hearty support of the proprietors. They were extremely pleased and satisfied with all the Board had done, and had the fullest confidence in what they would do in the future to meet the difficulties that might arise. Especially had they confidence in their Engineer. He had great pleasure in moving a vote of thanks to the Chairman and Directors.

Mr. Cecil seconded the motion, which was cordially agreed to.

The Chairman, in responding, expressed the gratification of the Board at receiving the approval of such a past-master in the art of gas making as Mr. Livesey. He then proposed a vote of thanks to the officers and their staffs; speaking in glowing terms of the work of the Engineer (Mr. H. E. Jones) and the Secretary (Mr. H. D. Ellis).

The Deputy-Chairman seconded the proposition, which was unanimously passed.

Mr. Jones, in reply, said he was much obliged to the proprietors for their kind vote of thanks to himself and his staff. Probably they had not earned the vote better in any year within his memory than they had done in the past year and the preceding one. These had certainly been years of hard work. The one thing the staff would like would be to have a little more margin without raising the price of gas. Increasing the price was, of course, out of the question. He was as firm a believer now in "Cheap Gas" as he was thirty years ago when he wrote anonymously over that signature; and the writer who adopted the *nom de plume* of "Keep the Lead," he believed he might say, also retained his early conviction that the policy of the day must be the utmost cheapening of gas. The Commercial Company had for thirty years been in a very exceptional

position. They were the first to take the sliding-scale; and, because they showed that spirit of adventure, they were the last Company to receive the power of allotting capital to their shareholders instead of putting it up to auction. In those palmy days when the margin of price was more liberal, and the prices of labour, coal, and other things were more reasonable, they thought it a very inviting prospect, and a very good plum. But the incidence of having to raise money for 24 years at these rates, coupled with the increasing expenses in every direction, the increasing uncertainty that surrounded them, and the increasing pressure that the public even were putting upon gas companies, led him to wish that they might have a little more margin, and not be fixed in such a tight place. But wherever the slackness came from, it must never come from raising the price of gas. Years of observation had convinced him of the enormous possibilities that were open to gas supply if only it were cheap enough. There was a tremendous field for gas for motive power and fuel. But the price of the gas for these and other purposes must be kept low, whether the shareholders got 10, 7, or only 5 per cent. He would, however, take care, as long as the proprietors gave him their confidence, to do his best to make the price cheap and the dividend as good as possible. But the dividend must give way to the necessity of the case—that was, the necessity of supplying cheap gas in every possible direction. He had no fear; but he would ask them to be a little merciful, and let them have cheap money. Then the enormous elasticity which he had observed in the gas business would turn them round the corner, and would still permit the proprietors to meet and accord to him and his colleagues a hearty vote of thanks.

Mr. Ellis also responded; and the proceedings then terminated.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly Meeting of this Company was held at the Offices, St. Helen's Place, Bishopsgate, E.C., last Thursday, under the presidency of Mr. George Banbury.

The Secretary (Mr. I. A. Crookenden) read the notice convening the meeting; and the report of the Directors was taken as read.

The Chairman reminded the proprietors that when he last addressed them he was able to place before them a very satisfactory state of affairs; and for some time afterwards this prosperous condition of things continued. The revenue was on the increase; better houses were being built; the supply and pressure all over the district were never better; and complaints were never fewer in number. But of late the forces of Nature had been mercilessly against them; and the severe drought, following on several dry seasons, lowered the flow of the River Lea—their main source of supply—to such an unknown extent that, in order to render the reservoirs capable of bearing the unwonted demands upon them, they had to revert to the intermittent supply. Of course, there was immediately a great outcry against them. Some said it was for their own selfish ends; and others that there was really no drought, and that it was all owing to their apathy and neglect. He would just briefly touch upon each of these several assertions. As to the first, nothing could be further from the Company's wishes than to meddle with the constant service, as any interference therewith caused them endless worry, anxiety, and enormous expense. It was therefore only upon pure compulsion that they took this retrogressive step. As to there being no drought, the rainfall for the past twelve months was only some 12⅓ inches, against the usual average of 24½ inches. Still, all would have gone on well with far less than the average rainfall; but when it came this year to well-nigh a cessation of rain, or only 9 inches in nine months—which was 50 per cent. below the average—the necessity arose for their measures of safety until the long-delayed downpours should set matters right again. As they were well aware, the drought was not confined to the East London district. Many towns, country places, and canals had suffered, and were suffering, to a great extent. In fact, there had been letters and articles in the papers to the effect that many country residents only wished that they were half as well off for water as the inhabitants of East London. In several large towns—such as Edinburgh, Croydon, Leicester, Leeds, Bradford, Birmingham, Paris, and other places—the supply had had to be curtailed owing to the persistent absence of rain. As regards the serious want of water in many places, and as to Leeds especially, he might read a short extract from an article in the previous Tuesday's "Times"—

> If there is any consolation in contemplating the misfortunes of others, East London consumers already have it in abundance. Many country places are absolutely waterless, and have to fetch every drop from a distance of several miles; while the shortage in the large towns in the Midlands has assumed a very serious aspect. Even Leeds, which lies outside the area of severe drought, and normally has the largest supply of all the very big provincial towns in England—even Leeds has been placarded with notices peremptorily forbidding the use of water for washing windows and doorsteps, and for similar purposes, under a penalty of £5. This is an instructive illustration of the advantage of having a public water authority which can enforce economy with a heavy hand when the public interest requires it. One shudders to think of the indignation meetings and the denunciations that would ensue if a London Water Company dared to take such a step. And yet the Leeds people pay their water-rates all the same, whether they get the full supply or not. Perhaps the aggrieved Londoner may find some balm in the reflection that even municipal engineers have "miscalculated" their resources in this year of grace, and that the consumer has to suffer without redress.
>
> There was a great Musical Festival going on at Leeds at the present time; and one of the evening papers on the previous night said:
>
> The large fountain which occupies the centre of the space in front of the Town Hall, flanked by statues of Wellington and Peel, is handsomely decorated with evergreens in pots and tubs; but, sad to relate, in consequence of the long drought, the water will not be turned on. Another reminder for East London that it is not the only sufferer this autumn!
>
> There was rather an interesting letter in the "Pall Mall Gazette" of Aug. 24, showing that this remarkable deficiency in the normal rainfall had deprived London of 102,000 million gallons, or a sufficient quantity for fifteen months' supply. Lastly, as to want of foresight, they doubtless remembered how, after much opposition, the Company obtained parliamentary sanction for augmenting their storage by 600 million gallons. Aided by this additional reserve, they were enabled, notwithstanding the prolonged and pitiless absence of the usual rains, to maintain the constant supply until Aug. 22 last; their reservoirs being full on June 20. No sooner were these works completed than, again looking ahead, they last year obtained further powers to construct other reservoirs to hold an additional 1000 million gallons. They had increased, and were still increasing, their supply from wells. They had laid down new arterial mains to meet satisfactorily increasing needs; and they had had schemes for further supplies under consideration and discussion. It seemed somewhat paradoxical, that those who killed the Company's Bill in 1893 for more storage reservoirs, and who nearly repeated the process in 1894, on the grounds that the Company had plenty of water, that their application to Parliament was premature, and that they merely wanted to enhance their purchase value, should now turn round and upbraid them for want of prudence and foresight. He was speaking the other day to an engineer who was quite independent—holding no water stock—and who made what he (the Chairman) thought was rather a pertinent remark. He said: "If your opponents had really known more about the matter, they would not have protested to Parliament against what you were asking for, but they would have 'pitched into you' for not asking for more." They had been condemned, vilified, and abused plenteously; but, singular to say, the point upon which they might be open to criticism and stricture had not been urged against them—probably because their detractors were more open to blame than themselves. He referred to the fact of their not having in days gone by insisted upon cisterns being fixed in every house. They had the vestries, sanitary authorities, builders, and landlords all against them. It was, however, certainly a temptation to confer upon the dwellers in the poorer tenements the seeming boon of a supply of water direct from the Company's mains, without the intervention of cisterns which might become foul. But subsequent knowledge had shown that there must be cisterns co-existent with the constant supply—in fact, during temporary intermittent service, those with cisterns hardly perceived any difference. As a high official water authority said to him: "If you could have an ideal supply that never failed, ideal engines, pumps, and mains that never go wrong, and ideal consumers who always go right, you might do away with cisterns; but as long as human affairs remain as at present, you must have these necessary household receptacles." The correspondent of one of the morning papers who paid frequent visits to the poorer parts of the East-end, had written as follows upon this important matter:—
>
> And here let me observe that all the discomfort due to the intermittent water supply would vanish if these houses had cisterns. There was not one I visited which might not have had a 50 or 100 gallon cistern conveniently and properly placed. Those who object to their provision on sanitary grounds, are evidently unaware that the question has been carefully inquired into by the highest sanitary authority in the country, which pronounced unequivocally in their favour.

Throughout this remarkable period of heat and drought, there had been nothing approaching a water famine, as the Company had been supplying 32 million gallons a day, or 24 gallons per head, during two periods of the 24 hours. Formerly the intermittent supply was universally in force; and in some instances it remained so to the present day. But now its temporary adoption was termed a "water famine." Millions of people must therefore until recent years have undergone this infliction without being in the least aware of it. As to the quantity of water supplied, he might mention that in "The Times" of the 12th ult. there was a table giving the amount of water supplied at the end of August in twenty-five towns in England and Wales. This showed that only three towns gave more than the average of all London, and no fewer than thirteen towns were now putting up with less water than the East London restricted supply. As already stated, the occupants of the poorer tenements without cisterns suffered annoyance and inconvenience from the cessation of their wonted abundant flow. To remedy these discomforts as far as possible, 26,000 earthenware vessels for holding water had been provided by the Company, and freely distributed. Stand-pipes had been erected upon the fully-charged mains; and they had cordially co-operated with the various local authorities in their efforts to aid the poorer classes by undertaking to pay for water-carts for the daily distribution of water in those localities where such a course was deemed necessary. They had purchased, and were still purchasing, all the supplies available from the Kent, New River, and Southwark and Vauxhall Water Companies, as well as smaller additions from other sources. The New River Company at once acceded to their request for aid, and, for some time before they had to shorten their supply, sent to them daily down the Lea what they could spare at their Hertford intake. Had not the usual rains failed entirely, this help would have saved all difficulties. But with a view of providing for the worst, Mr. Bryan, who had previously been in communication with Mr. Restler, the Engineer of the Southwark and Vauxhall Company, carried out a connection with their mains and those of that Company through the Tower Subway. For this valuable addition to their supply, grateful thanks were due to the Southwark and Vauxhall Company, to their Chairman (Sir Henry Knight), and especially to Mr. Restler, for his hearty and able co-operation. The plans and plant were speedily got ready, and the work commenced without a moment's delay. "The Times" correspondent who was present when the water first passed through the pipes laid in the Subway said:—

> The work was begun on Sept. 1, and has therefore taken less than 18 days. Credit for its completion in several days less than the most sanguine estimate, must be given, not only to the Engineers and Contractors (Messrs. John Aird and Son), but also to the firms who supplied the special materials required at the shortest notice, and to various Companies affected, whose hearty co-operation has greatly facilitated the proceedings. Lastly, but most honourably, to the men who have toiled day and night in the tunnel throughout the hot weather. On Saturday, one of them fainted from the excessive heat.

They gratefully recognized the valuable assistance of many of the local authorities; and they moreover tendered their thanks to the great body of their poorer and cisternless customers, for bearing the temporary trouble with great good temper and equanimity. As already mentioned, the Company did their best to lessen the discomforts resulting from the interruption of the constant service; but he could not help thinking that in some quarters political feeling, a desire for notoriety, and *cacoethes scribendi* exaggerated matters. Certainly, their difficulties were increased

by the remarkable weather which prevailed during August and September, and by the waste that took place during the restricted hours of supply. There was some good rain on Aug. 7; but after that waves of intense heat set in, with absolute drought, and with tropical weather altogether exceptional in September. Clouds gathered, the barometer went down, and the forecasts led to the belief that rain was coming. Nothing but a few drops, hardly to be dignified by the name of a shower, however, resulted from these portents. The weather report for September gave the rainfall at only 0·31 inch, or exactly one-seventh of the average; and it went on to say that, as regarded London, "the present year is so far the driest on record." Then there was another curious thing. Though during July, August, and September the weather was often intensely hot, the thunderstorms that might naturally have been looked for were altogether absent. This driest of summers, following one of the driest of winters, of course, reduced the flow of the Lea, as registered at Field's Weir, far below any previous record. There was ample proof that a good deal of the quantity supplied to the consumers during the shortened hours was wasted—partly by carelessness and neglect, and partly from a desire to "serve out the Company." In fact, this latter motive was both openly and covertly avowed in certain letters to the Press. The proprietors knew well enough that the old theory of mains shattered by frost was itself completely shattered at the inquiry before the Local Government Board Commissioners; therefore he would only remark that the less quantity pumped per head under constant supply since the frost, and the readings of the Deacon meters, conclusively proved that the decision of the Commissioners was correct. He might state that after the great frost the Company spent nearly £40,000 from income in lowering and improving the mains, so as to mitigate the effects of any future frost, and to permanently benefit their system. He must not close his remarks as to the temporary alteration in their usual mode of supply without expressing their hearty thanks to most of the leading newspapers, for the fair and admirable way in which they put the case before the public. From personal inspection, and from information obtained from trustworthy sources, the whole state of affairs was accurately, clearly, and justly represented to their readers. The proprietors were aware that the Hackney Vestry had instituted proceedings against the Company before the Railway Commission. One would have thought that the universally acknowledged drought would have been sufficient answer; but the Company were prepared to meet any case that might be urged against them. He ought perhaps to tell them that the Royal Commission had sat some thirty days, and had heard the evidence of the London County Council, the Outside Authorities, and certain independent witnesses. The meetings would be resumed early in November, when the evidence of the Companies would be proceeded with. Turning to the working of the past six months, there had been a substantial increase in their revenue when compared with the same period of 1897, amounting to £9421, which brought up the increase for the whole year to £20,000. Much of this additional income during the past half year had, however, disappeared by certain necessary unavoidable demands upon revenue which had to be met. Coals, engine charges, and parish rates had all involved a larger outlay; but the heaviest additional expenditure was for new sand for their filter-beds, which came to over £2500. This, of course, was a very necessary outlay, as, without keeping up the most essential element in their filtration to the very highest point of efficiency, they would not maintain their present character for purity of supply. It was satisfactory to observe that the amount written off for empties, bad debts, &c., was still further reduced by £500, when compared with the same items in last year's return. They laid on water to 2981 new houses during the past six months; and, as usual, these new tenements were mostly east of the Lea and outside the Metropolitan area. The rate per house paid by these new comers averaged £1 3s. 8d., which was nearly 9d. per house more than that of the corresponding time last year. In addition to the new dwellings, they put on 222 new meter supplies; so that trade prospects might be deemed fairly hopeful. He mentioned that in the newly-built houses they supplied, including those rented at 10s. a week and under, there were, as a rule, fitted baths with hot and cold water laid on, for which the Company's charge was 4s. a year. This sum was fixed for fitted baths by the Company's Act of 1853, when comfort and cleanliness were far less to the front than at present. Those who lived in some country places, and knew the amount of pumping required when baths were frequently used, must think an annual charge of 4s. for this item remarkably reasonable. There was an increase of nearly £900 in their law charges, mainly attributable to costs with regard to the Royal Commission from March, 1897, to June of the present year, and including all Counsel's fees connected therewith. Their wells had been their salvation; and as there was between these wells and the River Lea a thick, impermeable stratum of London clay, they did no harm to the flow of the stream. He mentioned on the last occasion that the well at East Ham would prove valuable to them, and this had certainly been the case. They fortunately struck some good, additional fissures there; and during the period of scarcity—though the work was still incomplete—this outlying district had reaped much benefit from this source of supply. Sir Edward Frankland, the Government Analyst, when sending them the analyses that he had made of the water from this well, congratulated them upon its purity. They were improving their yield from the chalk at several stations; and as they pumped but little from their wells when river water was plentiful, the shafts and adits filled up, forming satisfactory underground reservoirs. They had already acquired a considerable amount of the land for the new reservoirs lately sanctioned, and hoped before long to get the work in hand. The official reports of Sir E. Frankland, Sir W. Crookes, and Professor Dewar upon the results of their analyses of the London water, showed that during the past six months the East London Company stood as a rule next to the New River Company in point of purity (that was usually the case), and that the removal of the bacteria from the raw water by their storage and filtration was very marked—reaching as high as 99·85 per cent. He might mention that in his last report upon the East London water, Sir E. Frankland said that "after storage and efficient filtration, it was delivered in excellent chemical and bacterial condition." Figures then followed, showing that the above processes eliminated over 99 per cent. of the bacteria—thus practically removing them all. Sir E. Frankland further stated that the "deep-well waters of the Kent and East London" were "of excellent chemical quality." The Companies' Analysts closed their report for last month with the following remark: "The excellent quality of the water supplied to London during the past month has been fully maintained." He was glad to say that the health of the district, as ascertained from skilled and independent testimony, continued to be satisfactory. When the President of the Local Government Board received a deputation from the East-end on the 24th ult., Mr. Chaplin told them that Dr. Bruce Low, who had been in constant attendance in the district, reported that "in the four weeks before the intermittent supply, the death-rate from all causes had begun to increase in London generally, but more particularly in the East London district. The increase has continued since the intermittent supply, but has relatively been less in the East London district than in London as a whole." The result was the same as regarded diarrhœa, as the report went on to say: "The fact that the increase has been relatively less in East London than in London as a whole, since the constant supply in East London failed, is satisfactory, as suggesting that the scarcity of water has not had any appreciable effect on encouraging diarrhœa." At a meeting of the Metropolitan Asylums Board, held about the middle of last month, the Chairman's conclusions were similar to those of Dr. Bruce Low, as he stated "that at present, at any rate, there was no evidence to show that any undue amount of disease was arising from scarcity of water in the East-end;" also that "the proportion of the cases of disease notified in the eight East-end parishes to the number occurring in the whole of London was last year 28 per cent., as compared with 20 per cent. this year. Dr. Sedgwick Saunders, Medical Officer of Health for the City of London, reported that "the health of East London compared favourably with that of the Metropolis generally;" that "from a chemical point of view the condition of the East London Company's supply in its present state was purer than in April, 1897, and as wholesome as the New River Company's water;" and that "the difficulties that had arisen depended rather on the absence of means of proper storage of water for domestic and sanitary purposes" than in diminished supply. He (the Chairman) would not trouble them with statistics confirming the above statements, but would merely say that in the Registrar-General's report for the week ended Saturday, the 24th ult., West Ham, the extensive district entirely supplied by the Company, stood second among the 33 large towns of England as regarded lowness of death-rate. Portsmouth stood first, with 15·9 deaths per 1000; and West Ham second, with 16·4. London as a whole stood at 21·6; and Brighton, at 24·3. Their Engineer and Secretary had rendered them most valuable and efficient aid; and their thanks were due to these gentlemen and to their staff for their valuable work during these trying and anxious times. Finally, as regarded the dividend, he had already said that the past half year had been a very favourable one for them; and had it not been for the late almost absolute absence of the usual rainfall, they would have paid the same dividend as last time, at the rate of 8 per cent., and carried forward a good round sum to the reserve. After due consideration, and having in view the heavy outlay which this catastrophe—for he could call it nothing less—would entail upon them, it had been determined to decrease the dividend and to increase the reserve fund to £27,000; and this was evidently the wisest course to adopt. He concluded by moving the adoption of the report and accounts and the declaration of a dividend of 3½ per cent., less income-tax, on the ordinary stock of the Company for the half year ended Midsummer last, payable on the 13th inst.

Mr. Herbert Dalton seconded the motion.

Mr. H. Rokeby Price said he thought that both the proprietors and the general public must feel very much indebted to the Directors and the officers for the outcome of the past half-year's working. He thought that the Chairman's speech was a vindication of the Company's endeavours to meet the demands which had been made on them.

The resolution having been carried unanimously,

The Chairman said the Directors were all very much obliged to Mr. Rokeby Price for his kind mention of their services. It was a great strength to them to know that they had the proprietors' confidence and sympathy. Rain did not appear to be coming; but he thought it must do so before long. A few days' good rainfall would make a wonderful difference in their position.

Mr. Price proposed a vote of thanks to the Chairman, Directors, and officers, and said he thought that great judgment had been displayed in decreasing the dividend declared on the present occasion and increasing the reserve fund.

Mr. Baddeley, in seconding the motion, remarked that there was no doubt all the proprietors fully realized that the Directors and officers had passed through a most anxious time; and they felt that the Directors and the officers were entitled to their warmest thanks and sympathy for the way in which they had conducted the affairs of the Company. Some people found fault with the Directors for not having power over the elements; attributing to them the continued absence of rain. In his opinion, the dividend had been most properly reduced for the half year; but they might look forward to their affairs being so conducted in the future that they would soon revert to the dividend which they had been receiving in previous half years.

The resolution was carried unanimously.

The Chairman, in reply, said he could only repeat what he had already stated, that the proprietors' encouragement and sympathy were regarded by them as of the utmost value. Of course, they had had a most trying time; but it had fallen, as they must be aware, principally on Mr. Bryan, whose health, he was happy to say, continued to be fairly good, but whose anxieties at the present time never ceased, either by day or night.

The proceedings then terminated.

Gomersal Water-Works Arbitration.—Mr. S. H. Crowther, of Huddersfield, the Umpire in this matter, has awarded the sum of £8410 as the price to be paid by the District Council for the undertaking and interest of the Water Company. The costs of the arbitration are, by agreement, to be also paid by the Council. The undertaking was valued by Mr. Fenwick, one of the expert witnesses for the Company, at thirty years' purchase of the net annual profit (£600), and by Mr. Charles Gott at twenty-five years' purchase. For the Council it was contended that not more than five years' purchase should be allowed as compensation for disturbance; the Company having no statutory powers. The Company had, however, an agreement with the Bradford Corporation which has yet 15½ years to run, and it would appear that the award has been made on the basis of this agreement.

THE GAS QUESTION IN VIENNA.

Defeat of Dr. Lueger.

In the "JOURNAL" last week, it was stated, on the authority of the Vienna Correspondent of the "Daily Chronicle," that the Imperial Continental Gas Association had obtained from the Municipality of Vienna a contract for lighting up to 1911 the suburbs now supplied by the Association. The agreement come to between the parties was considered by the Stadtrath (which is equivalent to a Court of Aldermen in London) last Tuesday, and passed without alteration; but it had to be sanctioned by a full sitting of the Municipal Council. It is just two years since this trouble began in Vienna with the bold declaration of Dr. Lueger that by the end of October, 1899, the English—by which he meant the Association—must be turned out of the city. In view of the present position of affairs in the Austrian capital, it will not be out of place to briefly narrate the story, as told by the correspondent of the "Financial News." Writing on the 2nd inst., he said:

"They were haughty and wanton words which our burgomaster uttered when he formally made known to 'his people of Vienna,' that he would not rest until he had 'driven the English from Vienna.' Vainly even the Liberal members of the Communal Council, who favoured the project according to which Vienna should take under her own management the lighting of the city, endeavoured to convince their colleague of the uselessness of constructing new gas-works, and to advise him to enter into fresh negotiations with the Imperial Continental Gas Association. Self-conceit, however, triumphed over reason and reflection. The English Company, it will be remembered, were prepared to cede their works to the city for 16,500,000 fls.; and possession could have been had this year. These conditions were much more favourable than those previously offered; and if Dr. Lueger had accepted them, it could have been said even then that he had carried out a large operation successfully. He, however, refused. He had sworn to drive the English out of Vienna. At once the construction of new gas-works and the laying down of new pipes was commenced. The result is that Vienna looks like a heap of ruins, and traffic is interrupted, while the cost of the new works is estimated at 40,000,000 fls.

"But now comes the worst of it. Vienna is losing her actions against the English Company. For the better understanding of this affair, let me explain that Vienna comprises ten old and nine new districts. The latter nine up till recently formed autonomous parishes, which, as such, had independent contracts with the Imperial Continental Gas Association for a period expiring in some cases in 1908, in others in 1920. Two judgments have now recognized the validity of these contracts, even after the districts had been incorporated into the city. These decisions have had the effect of upsetting the estimates of the municipal gas schemers, who had reckoned on supplying light for the entire Municipality.

"Dr. Lueger was at last obliged to relax, and enter into negotiations with the Association. The day before yesterday, rumours to this effect were circulated; to-day they are confirmed by the 'Neue Freie Presse.' The English Company intended for the ensuing year to lower the price of gas; and would undoubtedly have compelled the Municipality to follow suit. As an inevitable consequence, the new venture, which, according to the predictions of the anti-Semites, was bound to become a gold mine for the municipal finances, would have scarcely paid at all. This imminent danger caused Dr. Lueger to change his tactics. Moreover, there is another eventuality—viz., that the new works may not be ready in time, and that therefore Dr. Lueger would have to ask the English to continue the supply of their gas for a certain time to the whole town. According to the 'Neue Freie Presse,' therefore, the following agreement has now been arrived at: Without considering the above-mentioned judgments, the Imperial Continental Gas Association keeps the exclusive right up to 1911 to light eight districts, and it is provided that no lowering of the price of gas shall take place. Besides this, the Municipality will take over the meters in the old districts for 1,330,000 fls. This agreement, although still awaiting the sanction of the Communal Council, signifies the complete defeat of Dr. Lueger. For 16,500,000 fls. the existing works could have been purchased; and now 40,000,000 fls. will have to be spent, and yet up to 1911 only the old districts will be lighted by municipal gas. On the other hand, the population were promised cheaper gas; and now the competing Company must be asked not to lower their prices.

"Six or seven months ago the 'Financial News' had already foreseen as probable an understanding with the Association, and pointed out how they would make a much better deal by supplying the suburbs until the expiration of the contract than by selling the works for 16,500,000 fls. There is not the slightest doubt that the English Company will be able by 1911 to do very well by their shareholders. Will this defeat of Dr. Lueger at last open the eyes of the Viennese population? It remains to be seen. In any case, the understanding with the English Company means the utter failure of the anti-Semitic municipal campaign. Dr. Lueger's prestige has suffered considerable damage; and the movement for ruining a group of investors who relied upon the good faith of the Municipality of Vienna has distinctly failed, assisted though it was by a leading German bank."

The agreement come to between the Municipality and the Association was laid before the Communal Council last Friday; and it gave rise to a very turbulent discussion—noisy scenes being witnessed both on the floor of the Chamber and in the galleries. The vote was taken amid the most deafening uproar, and resulted in the adoption of the contract. The Vienna Correspondent of the "Standard" characterizes the proceedings during the sitting as "scandalous;" while his colleague of the "Daily Mail" says it was the "rowdiest sitting of the Council which has ever been known." This was his description of it: "From six o'clock, when the sitting began, until ten, when the anti-Semitic majority ejected their opponents from the Town Hall by main force, a deafening tumult prevailed. City Fathers fought like men bereft of reason, belaboured each other with sticks and fists, tore each other's hair, and scratched each other's faces. Ink-pots were hurled at the Chairman, whose voice and bell alike were drowned by the shouts of the contending councillors, who, in addition to shouting, beat their desks with flat boards. At the conclusion of the sitting, black eyes, bleeding noses, disfigured faces, and torn clothes were to be seen on all sides. The anti-Semitic majority claim to have affirmed the contract with the English Company, though amid tumult." At the conclusion of the sitting, the disturbance was continued in the street—a small group of councillors on emerging from the Town Hall being received with jeers by a mob of young roughs, who followed them for some distance. The Progressist party in the Council subsequently held a meeting, and unanimously decided to lodge a protest against the validity of the vote. The protest was promptly forwarded to the President of the Council. It is believed that the protest will have no effect, nor will it impair the validity of the agreement.

SWANSEA GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Friday—Mr. T. T. WOODS in the chair.

The report of the Directors showed that in the six months ending June 30 a net profit of £5290 had been earned—sufficient to pay the full statutory dividends. Adding the balances brought forward, there was a sum of £2958 to carry to the credit of the profit and loss account. Notwithstanding the depression in trade and the extraordinarily mild temperature during the half year, the increase in the consumption of gas amounted to 6·8 per cent. as compared with the six months ending June, 1897. This resulted from additional consumers and the large number of gas cooking-stoves fixed during the half year.

The CHAIRMAN, in moving the adoption of the report, referred to the passing of the Swansea Gas Act of last session, which received the Royal Assent on the 23rd of May, and congratulated the shareholders that all the rights, powers, and privileges of the Company remained intact. He then detailed the objects of the Act, which are the raising of the capital to £120,000 of 5 per cent. ordinary stock, the consolidation of the various shares into one uniform 5 per cent. stock, the increase of the borrowing powers to £30,000, and authority to sell gas by prepayment meters, and other purposes. He announced that from the 10th of June to the 29th of September no less than 1290 applications for coin-meter supplies had been received, and stated that there was every indication of the increase continuing. He gave particulars as to the sale by auction of the new ordinary stock on the 22nd of July, which realized £24,723 15s., or equal to £123 12s. 4d. per £100 of stock. He congratulated the shareholders upon the continued prosperity of the Company and the increase of gas consumers throughout the district. In conclusion, he indicated the various diminishing expenditures which by economical management had been carried out as compared with the half year ending June, 1897. He pointed out that the chief increases in the revenue were £1168 in the gas-rentals, £200 in the residual products, and £100 in the sundry receipts. With respect to the coin-meter system, he mentioned that the Company were put to a large expense in fitting up houses for it, and that the work was being performed in the best style consistent with economy. He trusted that all small private dwellings would ere long be supplied with gas, which would tend a great deal to improve the aspect of houses at night time, and render workmen's homes comfortable and economical.

The report was adopted.

The usual resolutions authorizing the payment of the full statutory dividends, and the passing of votes of thanks to the Chairman, Directors, and Engineer (Mr. Thornton Andrews) for their services during the past half year, closed the proceedings.

Interest in the acquisition of the Swansea Gas-Works by the Corporation has been revived by the publication of an article, with subsequent correspondence, in the "Cambrian." The following figures have been put forward by one writer to show how the works may be purchased: Maximum dividends, £10,100 per annum, at 28½ years' purchase, £287,850; 10 per cent. on ditto, £28,785 (together, £316,635); debenture stock, £37,408—total, £354,043. Repayment: Interest at (say) 2¾ per cent., and sinking fund at 1¼ per cent. (together, 4 per cent.), for repayment in (say) 45 years. Four per cent. on £354,000 gives £14,160 for paying interest and sinking fund. Against this there is the profit for the year ending June 30, 1897, £11,817; saving in Directors' fees, £600; ditto in salaries, £1000; economies in other directions, £500—total, £13,917. This would leave a deficiency of £243 per annum. The calculations have been based upon the capital, dividends, &c., of the Company before the fresh capital was raised; and the writer admits that they are liable to modification and alteration. He sees no reason, however, why the Company and the Corporation should not come to terms on a basis something like the above.

COLONIAL GAS UNDERTAKINGS.

The reports of two Colonial undertakings have come to hand since the arrival of the particulars published in the "JOURNAL" for the 27th ult.

In the six months ending the 30th of June, the Brisbane Gas Company received £19,260 for gas, &c., supplied; while manufacturing expenses, depreciation, &c., came to £11,265. The balance at the credit of the profit and loss account at the above-named date was £8878, including the amount brought forward. The Directors recommended a dividend of 4½ per cent., amounting to £6295, the tax on which came to £315; making together £6610, and leaving £2268 to be carried forward.

The North Shore (North Sydney) Gas Company, Limited, made a net profit of £2949 in the six months ending June 30; and the addition of the balance brought forward made up £3022. Out of this the Directors recommended the payment of a dividend of 3 per cent. for the half year, £2700; setting aside £210 to provide for interest; addition to officers' fidelity guarantee fund, £50; interest suspense account, £20—making a total of £2980, and leaving a balance of £42 to be carried forward. During the half year, enlargements and extensions of the mains have been made in various parts of the Company's district. After careful consideration, the Directors decided to make the following reductions in the prices charged for gas, to take effect from the 1st inst.: 3d. per 1000 cubic feet to private consumers, making the price 4s. 9d. net; and 2s. 6d. per lamp to the boroughs of North Sydney and Mosman, making the charge £4 15s. per lamp per annum.

MORLEY GAS-WORKS ARBITRATION.

Tuesday, Sept. 27.

(*Before Mr.* J. Mansergh, *M.Inst.C.E., Umpire.*)

Last week we commenced a report of the proceedings at this arbitration, which was held to fix the price to be paid by the Corporation of Morley for the undertaking of the Morley Gas Company, under an Act obtained in the last session of Parliament. Our report ended with the evidence submitted on behalf of the Company.

Mr. Corbet Woodall was Arbitrator for the Corporation; Mr. Thomas Newbigging, for the Company. Mr. Balfour Browne, Q.C., and Mr. Frank Balfour Browne appeared for the Corporation; Mr. Pember, Q.C., and Mr. Claude Baggallay, Q.C., represented the Company.

Mr. Balfour Browne, in opening the case for the Corporation, said they had to consider what was the legal income of the Company, then whether the income could be maintained, and if so what was the security for it in the future. The Company had taken the income for the year 1897, which the Corporation said was wrong, inasmuch as the figures to June, 1898, were available. The Corporation also thought a larger sum should be deducted for wear and tear than the Company had allowed and set against the surplus. But the Company had made no adjustment of the revenue account, except in respect of what they called conversion of borrowed money into share capital. He should ask the Court to disallow every one of the ridiculous items of £166, £126, and £406, because the Company had not these sums—they did not exist in fact, and they never could have existed in a prudent and well managed company. Before the Company could have made the conversion, the consent of a general meeting of shareholders must have been obtained. This consent had not been secured; and no prudent body of shareholders would have consented to it. Moreover, it would have been a fraud upon Parliament to raise this large sum at 10 or 7 per cent. when in 1889 they had obtained parliamentary powers to raise capital at a very much lower figure. The claim under this head worked out to £21,477, which was simply a ridiculous figure. Then they took 10 per cent. on this £21,000, on the ground that the Corporation were purchasing compulsorily a thing which the Company never had. Further than this, to crown the absurdity of such a magnificent investigation, they claimed 2½ per cent. for re-investing money they never had. He therefore asked the Court to strike off this claim, together with the 10 per cent. and 2½ per cent. allowances on them. Passing on, Counsel pointed out that, though Mr. Stevenson had steadily said £400 ought to be spent in duplicating the boiler and providing another engine, he made no deduction in this respect. In the Corporation valuations, they started with the gross revenue for the year ended June, 1898—the latest year available, but which the Company had avoided because it showed a further decrease in trade. The Corporation, while not expecting Morley to pass away, did assert that its progress had not lately been very rapid; two of the principal trades on which it depended being very depressed. This depression was acting seriously to the detriment of the Company. It had been very serious in the last four years; and the half year to June last was the worst of the lot. The total income of the Company for the half years ending June, 1896, 1897, and 1898 was £6442, £6188 and £6048 respectively; and in the December half years of 1896 and 1897, the figures were £7020 and £6663 respectively. This diminution of income was considerable; but it was likely to be increased by public works in the town being finished. Under these circumstances, he held that the revenue was not well secured. The surplus of which they had heard so much was swept away by proper adjustments. It was contended that, if it was so swept away, further income could be produced by adding 1d. or 2d. per 1000 cubic feet to the price of gas; but surely this would be a ruinous thing to do in the face of competition. Having obtained the gross profits, the Corporation deducted the interest on the debentures and a further sum for interest on accumulated profits, which, with the reserve fund, had improperly gone into the works. He did not say they should not have any balance in hand; but it certainly should not be nearly as much as they had had. There were large undivided balances in the Company which really belonged to the consumers; and, further, they were indebted to the consumers some £4000 or £5000 in respect of income-tax paid for the shareholders. With the adjustments which the Corporation made, the income of the Company was hardly sufficient to pay the maximum dividends. The multiplier which the Corporation used was 25 years; and as to this the Court would have to be guided by the evidence on each side. The works were in several respects deficient; and regarding the unstamped meters, the evidence would show that the Corporation might have to stamp every one, at a cost of £931. Counsel, in conclusion, dwelt at some length on the point of the allowance of 10 per cent.; asserting that there was nothing in the Purchase Act entitling the Company to claim it. This 10 per cent., which was mentioned in the Lands Clauses Act, was only to give indemnification for damage done; but some way by which the Company were damaged must be found before anything of the kind was allowed. It was because the Committee did not intend to allow the 10 per cent. that they granted the Company the cost of re-investment. If the Company had proved further damage, the Court could have allowed it. But no claim for damage had been advanced; and therefore nothing could be allowed.

Wednesday, Sept. 28.

Mr. *Charles Hunt*, examined by Mr. Balfour Browne, said he had visited the works of the Company; and when in Morley he made himself familiar with the depression in trade there—the fact that collieries were being worked out, and that the electric light was being substituted for gas. As to the retorts, he allowed 10 per cent. for those under repair and contingencies, which would leave a productive capacity of 652,000 cubic feet per 24 hours. This figure was based on the actual production for mouthpieces as given him last winter by the Company's officials. It was fully 100,000 cubic feet in excess of the maximum daily make hitherto. There were two exhausters, one of 15,000 and the other of 30,000 cubic feet capacity per hour. These were to some extent in duplicate, but not fully so, as regarded the heaviest winter make. They were driven by one engine, the duplication of which, as with the exhausters, was necessary. The steam-boiler should also be duplicated. It was not sufficient for the boiler and exhausting machinery to be equal to the maximum requirements, because if at the time of the heaviest manufacture a breakdown occurred, serious loss might result. The scrubbers and condensers also were insufficient for the present make, and required supplementing. The purifiers, six in number, were each 16 feet square by 4 ft. 6 in. deep; four being for oxide of iron, and the other two for lime. They were insufficient for the present maximum production, and therefore clearly incapable of purifying anything like the 652,000 cubic feet of gas daily which the retorts could produce. There ought to be 0·6 foot of superficial area for each 1000 cubic feet passed through per 24 hours, for each purifier; and on this basis they would be about 25 per cent. deficient. There were three gasholders. The largest had a capacity of 500,000 cubic feet, and was prepared for the addition of a third lift, which would increase its capacity by about 50 per cent. One—of 32,000 cubic feet capacity—was so small as to be practically useless. The third—of 360,000 cubic feet capacity—was 30 years old, and therefore near the end of its life. The aggregate capacity was 890,000 cubic feet, or nearly 1½ days' maximum production. The usual quantity was 1½ days' production. Some portions of the works were in excess, while others were too small. The parts should all be of about the same capacity, in order that all might be made available. Some of the retorts were useless, because other apparatus did not correspond; so that the capital represented by the excess retorts was dead. To bring the works all into line would involve considerable sacrifice of existing plant. There was not nearly sufficient storage for coke. Under certain circumstances, where the demand was steadily increasing, and where one could bring the whole into line without sacrifice, excess plant might be looked upon as insurance. In the present case, to utilize the excess the purifiers would have to be very much larger than now, and more room provided for scrubbing power; and, the area being limited, this could only be done by sacrificing the small gasholder. Therefore in this instance the excess capacity could not be regarded as insurance, or giving security; it was waste. The demand for gas seemed to be decreasing, so that if the present excess works were a burden on the undertaking the burden was likely to be increased. The reconstruction of the works he referred to would involve a sacrifice of this other plant, the capital cost of the reconstruction would be a burden on the present revenue, and the plant sacrificed would have to be paid for out of revenue. The return of unaccounted-for gas—which included that used at the works, estimated at 1½ per cent.—had in the last few years much increased; it having been a little over 11 per cent. from 1890 to 1896, while in the past three half years it averaged 13·54 per cent. This loss represented about 400 cubic feet of gas per ton of coal carbonized, which was a serious item, and largely neutralized the good results the Company had obtained in carbonizing. Either the mains and services had been allowed to fall into a leaky condition, or mining had caused an increasing amount of disturbance. If the collieries were less worked than formerly, the mains and services were evidently becoming leaky, and sufficient money had not been spent on them. The total length of mains was 36,313 yards; 11,120 yards being 3-inch or under, and 4183 yards only 2-inch. The latter was not suitable for distributing, save in exceptional cases. A prudent manager would replace all the 2-inch mains by others of not less than 3 inches diameter, which would tend to reduce the unaccounted-for gas by lowering the pressure. The other mains should be examined; and, having regard to the leakage, he believed many would be found defective. The Company had been in the habit of repairing their meters themselves, but not re-stamping them afterwards, as was required by the Act. There must therefore be a large number unstamped. The cost of stamping, including removal, refixing, &c., was about 5s. per meter. He calculated the deduction necessary to make good deficiencies of plant as follows: Additions to purifiers, £1700; boiler power and exhausting machinery, £505; condensers, £350; scrubbers, £500; and £637 the cost of laying 4383 yards of 3-inch main, at 3s. a yard, in lieu of the same length of 2-inch main, which would be of no value to take up—making a total of £3757. This, in his opinion, was the sum necessary to bring the works up to a condition to make the dividends safe. The cost of stamping 3684 meters, at 5s. each, would be £921, which, with the £3757, made £4678 to be deducted from the capital sum representing the value of the works. In dealing with the revenue account, he took the year to June 30, 1898. The last half year was a bad one for the Company; but he thought it best to use the most recent figures available. The balance of revenue account in that year was £4521 8s. 5d., or less debenture interest, £134 6s. 11d., £4387 1s. 6d. The total sum the Company could divide was £3380; so that there was an apparent surplus of £1007. The next matter was one that ought to have been in the working expenses, but was not. If it had been, it would have decreased the balance and consequently the apparent surplus. He thought a fair amount to allow for repair and maintenance of mains, pipes, fittings, and apparatus was 5d. per 1000 cubic feet sold, which included inspectors but not meters. The amount actually spent was 2·21d.; and the difference—2·79d. per 1000 cubic feet on 87,344,000 cubic feet sold—worked out to £1015, which, with £105, being 3 per cent. on £3500 undivided balance, made £1120 to be set against the apparent surplus of £1007. There was thus a deficiency of £113. The undivided balance last June was £5668, or, less the half-year's dividend, £4173. Allowing £678 to be carried forward, gave the £3500. Having regard to the falling off in the consumption of gas and in receipts, he should say this was certainly not a well-secured undertaking. Moreover, the future expenses would probably be increased, because the price of coal had advanced and miners in Yorkshire were asking for a further increase of wages. To increase the price of gas was at best a most unsatisfactory way of recruiting revenue, and should be resorted to only in exceptional circumstances—not in face of a decreasing revenue and competition from the electric light. Witness referred to the increase which had occurred over a period of years; but he pointed out that the increase took place in the early years, and had now ceased. He should say it would be difficult to maintain the present consumption. He did not think there was a large field for prepayment meters in the Company's district; but even if a considerable number were used, it would not add much to the business. Prepayment meters did not always pay. At Manchester, they did not under these circumstances. He thought a full and fair price would be 25 years purchase of the maximum dividends payable, less the amount to be taken off for making good the deficiencies. Applying this figure to the maximum dividends (£3380) gave £84,500, which, less the cost of

making good deficiencies in works and of stamping meters (£4678), left £79,822 as his estimate of the full value of the works. The Corporation under the Act would take over the debenture and loan capital. The allowance for re-investment he ignored altogether.

Cross-examined by Mr. PEMBER: He did not think the retorts could make 7000 cubic feet of gas per mouthpiece. They were generator retorts; but if converted into the regenerative system, they could produce that quantity or more. When at the works, he inquired what the highest make last winter was; and it was on this information that he arrived at their productive capacity. He was not aware that during last winter the Company had 14 mouthpieces on, which were only temporarily and partially used. The exhausters were not in duplicate for the heaviest make; but he did not know that there had been a shortness of gas. There was always a danger of one breaking down. It would be an extraordinary thing, but if it did happen to the largest one, the remaining exhauster capacity would be inadequate. Except in their size, he saw no sign of inefficiency in the purifiers. He did not test the gas. There ought not to be more than two changes a week in a purifier, if the oxide was in fair condition.

Mr. PEMBER: As to storage, are you aware that all the coke sold is sold forward by contract, and away from the town?

Witness: No. It depends on the conditions of sale as to what storage is necessary.

You said that to bring the works into line would involve the sacrifice of the small gasholder?—Yes.

I thought you suggested that it was of little use?—Of little use for gas storage; but it would involve a sacrifice of money to get rid of it. It cost money to build, and that you would throw away.

Are you under the impression that Morley is going to decay?—I am of opinion that the gas consumption is not going to increase. In the recent parliamentary proceedings, I said there would probably have to be immediate extensions of the gas-works; but then the Corporation had not the information they now possess. The unaccounted-for gas has grown 4 per cent. in the last three or four years. The figures in this respect for the past twenty years appear to show a fairly steady improvement, down to 1891 or 1892. If the unaccounted-for gas is dependent on mining operations, that seriously affects the prospects of the Company.

But our income has been earned in spite of all these things?—Yes; but I am dwelling upon the increase in the unaccounted-for gas.

But I put it that the increase is not what you suggest—that for the four years up to last year it is only 10 or 11 per cent., having five years before been as much as 11·87 per cent.?—What I suggest is that if it was possible during a period of four years to keep the unaccounted-for gas down to 10 per cent., it ought to be possible to maintain it at that figure.

Anything we did to stop the leakage would be to our advantage?—Yes. We should have less gas to make to supply the demand; and it would be pecuniarily to our advantage?—Yes.

Mr. BALFOUR BROWNE: The only question is that it would cost money to do it.

Witness, in further examination, could not say whether the expenditure to secure the stoppage of the leaking would be greater than the saving.

Mr. PEMBER: With regard to the meters, have you heard that anybody has expressed discontent with the condition of them as they stand?

Witness: No.

I suppose the Corporation at any time could have insisted on meters being tested?—Yes; or any consumer.

What led you to suppose all the meters were unstamped?—We have no other information.

Mr. PEMBER (to the Umpire): What I am told is that half the meters were bought as new ones, and bought stamped.

Further cross-examined: Prepayment meters were being adopted in most large towns, including Birmingham; but in Birmingham they were proceeding very cautiously with them. He thought the Morley Corporation, when applying for their Purchase Bill, were under the impression the Company were more prosperous than was the case. He agreed that the Company had paid income-tax in error; if they had not done so, £151 would have been added to the profit. Money spent on new mains should come out of revenue, not capital; and the same with retorts. If there were 210 additional consumers last year it would not look like a decaying concern. In the Stourbridge case, he asked for 31 years' purchase; but there the income was progressive. He held that the two cases were not similar.

Re-examined by Mr. BALFOUR BROWNE: Whatever was the Company's method of disposing of the coke, their storage was absolutely incapable of dealing with it. If the £151 income-tax was improperly paid, it ought to go to the balances divisible among the consumers, not to the Company.

By Mr. CORBET WOODALL: If the leakage was excessive, the consumers were paying too much for their gas. He should look at the small mains and small services first to discover leaks.

By Mr. NEWBIGGING: The purifiers could be enlarged within the present house.

Mr. *Hemingway* was re-called; and, in reply to Mr. PEMBER, he said the new services in the year to June, 1898, numbered over 200.

Mr. *W. A. Valon*, examined by Mr. FRANK BALFOUR BROWNE, said that the works were in very fair order, but were not sufficient in general particulars for what was required of them. He estimated that to put the works in an efficient state would require £3480; and he adopted the figures of £657 for distributing plant and £921 for stamping meters, as combined in Mr. Chester's valuation, which made £5058. He handed in a table showing the reduction in gas-rental in the year 1898 over 1896 and 1897. In the year ended June, 1896, the gas sold was 92,869,800 cubic feet, and the gas-rental £9947 17s. 2d. In the year to June, 1897, the gas sold was 90,251,500 cubic feet, and the total rental £9685 2s.—showing a decrease on 1896 of £263 15s. 2d. In the year to June, 1898, the gas sold fell still further to 87,344,000 cubic feet, and the rental to £9381 11s. 1d.—or a further decrease on the preceding year of £303 10s. 11d. Thus the loss in 1898 over 1896 was £566 6s. 1d. The business of the Company at present was therefore going backwards. This was mainly due to bad trade, and to a great many mills using their surplus plant to produce the electric light. In his valuation he had taken the figures for the year to June, 1898. The gross profit was £4521 8s. 5d., from which he deducted £134 6s. 11d. interest on debentures, £105 interest on accumulated profit, and £1015 7s. 5d. in respect of additional expenditure required to bring the cost of repairs, maintenance, and renewal of works and mains to 5d. per 1000 cubic feet. This gave the maintainable profit as £3266 14s. 1d. The maximum dividends payable being £3380, a deficit was left of £113. Applying to the maximum dividends the multiplier of 25, which he held to be fair and liberal, produced £84,500; and this, less £5058 for deficiencies in works and plant, gave his final figure of £79,442.

Cross-examined by Mr. BAGGALLAY: Generally the works were insufficient for the make though they were meeting present demands, which he did not think likely to increase. The works also had produced maximum dividends for a great number of years, and provided a surplus.

Mr. BAGGALLAY: Do you know of any case whatever of a gas company, serving a district with a population of 24,000, and having a sale of between 80 and 90 million cubic feet of gas, who, having paid maximum dividends for a great number of years, has fallen behind?

Witness: I cannot quote any particular case at present; but I do not know that this applies to the present Company.

Mr. *Charles Gott*, in reply to Mr. BALFOUR BROWNE, said the staple trades of the district were woollen-cloth, coal, and stone. The first was very much depressed; and coal was not being produced so actively as formerly. The number of empty houses was increasing; being 92 in 1881, 169 in 1891, and 302 in 1898. He handed in a list of twelve mills which had installed the electric light for themselves; and there were also a number of important premises which had now adopted electricity. The present site of the gas-works was small, and owing to its surroundings could not be enlarged. The works, plant, and apparatus were all old; and if there should be a material increase in the demand, the Company must abandon their present site and go to a new one. Under these circumstances, the Company could only carry on business at a disadvantage, as compared with one having more modern works. In his valuation, he took 25 years' purchase of the maximum dividends, which produced £84,500; and he then deducted the amount required to be expended to supply deficiencies, which he estimated at £5000—making his final figure £79,500.

Cross-examined by Mr. PEMBER: Despite the depression, Morley was a prosperous borough, and had been rapidly growing in population.

In re-examination, witness said that, though the town was prosperous and the Company was a sound one, he still thought 25 years' purchase good value.

Mr. *Charles Beevers*, of Messrs. Beevers and Adgie, chartered accountants, of Leeds, detailed a list of eight mills which, in various half years, as compared with the half year to June, 1898, had decreased their payments for gas from £302 18s. 6d. to £151 11s. 9d.

Cross-examined by Mr. PEMBER: He had not the amounts for the intermediate half years. The inference he drew from the figures was that the falling off was due to the electric light.

Mr. BALFOUR BROWNE then put in a resolution, under seal, of the local Co-operative Society, who had paid the Company as much as £104 in a half year for gas, saying they were going to give up using it in favour of electricity.

Thursday, Sept. 29.

At the commencement of the proceedings to-day,

Mr. PEMBER informed the Umpire that the Secretary of the Company had ascertained that 2082 meters had been purchased within the last ten years, duly stamped according to the Act; leaving 1604 which might or might not be stamped.

Mr. BALFOUR BROWNE said he would accept the figures without the Secretary being re-called. The learned Counsel then proceeded to address the Umpire on behalf of the Corporation. He said the two questions to be considered were: What was the maintainable revenue? And how was the revenue secured? The better the security for an income, the smaller the interest people would lend at, and therefore the higher the number of years at which the income must be capitalized. In this case, the income could not exceed £3380; and though this amount had been earned to date, the works in any particular year might be in such a condition as to make immediate expenditure necessary. In such an event the £3380 would not be maintainable. It might be also that the revenue in a particular year was due to a peculiarly favourable contract for coal, or to very high prices for residuals. In this case the accounts would have to be adjusted. Here it was clear the works were in a defective condition, because in 1889 they obtained power to raise £40,000 with which to improve and extend them. The capital had not been raised; but that was because it was subject to the auction clauses, and would not benefit the shareholders more than other members of the public. It was admitted by the other side that there should be a deduction of £400, and that the revenue needed adjustment in connection with the expenditure on renewals and repairs; yet neither of these things had been done. Instead of making an adjustment, they fell back on the big balance they said they had. But this balance was not theirs, for they ought to have absorbed it by reducing the price of gas long ago. The £3380 was not maintainable. In order to maintain it, large sums would have to be expended on the works, and a considerable further amount on repairs. How was the income, if it could only be earned by the expenditure of this money, secured? It had been said that this was an opportune time to sell. If it was opportune for the Company to sell, it might well be said that it was inopportune for the Corporation to buy. It was opportune to sell because the shareholders had obtained all they could obtain; the maximum dividends being now paid, and all arrears cleared. If the Company had earned anything more, they could not have divided it; and so they had nothing to expect from the future. The only benefit of a surplus would be to secure their £3380. Strictly speaking, he thought the Company could be made to divide every penny of revenue. But the Corporation had not insisted on that; and out of the £4000 odd of balances, they had only taken £3500 as money to be devoted to reducing the price of gas. Regarding the prospects of the Company, on which the security of the income depended, he held that they were distinctly not good. The income was going down; there being diminutions in each of the last four half years. It was urged that this was only a temporary fluctuation, such as had occurred before; but it was more permanent than that, because they heard that mills were being closed or working half time, and that the coal trade was not prosperous. Supposing the income were secured in the best possible way, no one would think of giving even 28½ years' purchase; and certainly not in the present case, when, coupled with the preceding

facts, they found the electric light being adopted in the mills—not apparently by using the gas of the Company, but by utilizing surplus plant. Then the income-tax, if it had been illegally paid, belonged to the consumers. It would amount in the aggregate now to between £4000 and £5000, which sum was really due from the Company. This matter was difficult to deal with; but if the Company had been continuing in existence, and the fact had reached the Corporation, they would have had to make the Company refund this sum. That it was illegally distributed, was certain. They were also told that there were now more uninhabited houses in Morley than ever before. It was said that if the surplus were wiped out by further expenditure on maintenance and renewal, the Company could raise the price of gas. Mr. Chester, however, declared that it would be suicidal to take this step in face of competition. Regarding the allowance for re-investment, the Act said it was to be the reasonable expense incurred in re-investing the considerations paid for the concern. The actual expense was 1 per cent.; and this was all they were entitled to, because the section said nothing about compensation for loss or delay in finding an investment. As to the claim for compulsory purchase, he contended that if the Committee of the House of Lords intended to allow the Company the full 10 per cent., it was their bounden duty to have had it expressed on the face of the Act, just as they had stated that the Company were to be allowed the expense of re-investment. It was true that Lord Rookwood expressly asked whether the Lands Clauses Act carried the 10 per cent., and that Mr. Squarey for the Corporation said it did, and that following this the Lands Clauses Act was inserted. But if 10 per cent. was to be allowed, it would have been specified, as was the fact that the Company were to be reimbursed their parliamentary expenses, though these expenses were not even mentioned in Committee. The 10 per cent., or any portion of it, could only be allowed when loss or damage was established, not for compulsion; and there was no loss or damage in this case. Therefore, after allowing the cost of re-investment, he asked the Court to give the Company nothing in respect of the 10 per cent. claim. In conclusion, the learned Counsel briefly alluded to the conversion, which he said was absolutely illegal.

Mr. Pember, on behalf of the Company, referred at length to the conversion of the mortgages of £2800 and £1800, the temporary loan of £1800, and the reserve fund and floating balances. He said that the possibility of treating them as the Company's valuers had treated them, was an element of value. The Company could effect this conversion under section 56 of the Companies Clauses Act of 1845, which was incorporated in the Morley Gas Company's Acts of 1848 and 1868. A conversion had been effected once; and no one ever suggested that it was illegal. It could therefore be done again, with regard to any capital raised under these two Acts. With capital raised under the 1889 Act, it was different, because the auction clauses were in that Act; but these conversions were of capital under the earlier Acts. The learned Counsel proceeded to refer at length to the sections relating to the conversion of capital; asserting that they amply justified the Company's valuers in the course they had adopted. Therefore the legal possibility of conversion was an element of value which the Court could not disregard. It was no answer to say that the Company had not done it hitherto—possibly because they considered they had certain moral duties to their consumers. He acknowledged no moral duty to the consumers, nor any duty not to convert, if he had the power, and it was to his advantage. He claimed not only that he had the right to make these conversions, but that the advantage would rest with him; and this being so, the Court was bound to give effect to these potentialities. As to the reserve fund, he would grant that he ought to have borrowed money for the purpose for which he had used the fund; but this had nothing to do with his condition in the future. It would be merely a dereliction in the past, with which the Umpire had not to deal. He could still borrow the £4600, and turn it into 7 per cent. capital; and what was true of this was true of the balances also, because they were invested in the business, the business had had the benefit of the money; and the utmost that could be said was that the Company ought to have raised the amount and put it into the concern. Well, he would raise the money, and then he would convert it, as he was entitled to do; the surplus allowed plenty of margin. He should then have had the full benefit of the capital expenditure of this amount, and would be able to deal with this capital expenditure as the Company's Acts and the general law permitted. Here, again, the fact that he could effect this operation was a fair element of value. They had to consider whether the Company's income would stand these conversions. As a matter of presumption, they had the strong fact that the Company had paid maximum dividends for the last twenty or thirty years, and that in the same period they had paid out of income all arrears of dividends, which must have meant a large sum. They had even paid income-tax in addition, filled the reserve fund, and accumulated large balances. Could any facts point more directly to stability? As to the income-tax, even if it were an illegal thing, as Mr. Balfour Browne said, the Court was not in a position to punish the Company—to say whether an action would lie against the Company or the shareholders to recover it, which was very doubtful. The Umpire's business was with the future—to state whether or not the possibility of paying the £4078 obtained in the past was likely to be continued. There were only two things that were likely to interfere with this possibility—viz., the electric light and the decay of Morley. In general, he thought they might say the electric light had injured no company except The Gaslight and Coke Company, whose case was very exceptional. There was no evidence whatever that the Company had lost by electricity, though it would have been easy for the Town Clerk to have given particulars as to the supply of the light. The uses of gas multiplied from day to day, and it was that which prevented electricity having any very great effect on it. There was room for both. Even if electricity did hit the Company a little, the loss could be counterbalanced by the addition of 1d. or even 2d. to the price of gas, which, the price being so low, would cause no one to abandon gas or use less. Concerning the decay of Morley, there was the evidence of Mr. Gott (who was the nearest approach to a Morley man they had had) that the town was prosperous, though it had certainly suffered ups and downs. Still, the accounts showed that, taking the figures for the years 1895, 1896, and 1897, in each case ending with December, the profit had risen from £4286 to £4536, and then to £4900, which gave an increasing surplus amounting in 1897 to £1291. To this he was entitled to add the income arising from the investment of the reserve fund at 3 per cent. (£138), also the income-tax (£151 a year) which had been paid in error. This made the total surplus £1580. All through the case, he had forgotten to add the interest on the temporary loan of £1800, which the Company ought to have raised, and could have raised, at 3 per cent. This would increase the surplus to £1634. Against this, he proposed to charge the three figures of £166, £126, and £406, which left the net surplus at £936. This sum, capitalized at 3 per cent., gave an amount of over £30,000 which would stand between the Company and any difficulty in paying the maximum dividends of £4078. Counsel did not agree that anything like £5000 ought to be spent on the works to make good deficiencies; but supposing he charged the surplus with the interest on that sum, it would only be reduced by £150. To destroy the position of the Company, the Corporation valuers adopted as a basis the figures for the non-natural year to June, 1898, and asked the Court to add £1015 to the Company's annual expenditure on repairs—that was to say, to calmly increase the working expenses by 25 per cent. Even if he accepted Mr. Chester's figure of £647 as a deduction, there was still a balance of £289, which would meet the £150 interest on the £5000, and leave £130 or £140. Then it was said the 2-inch mains were inadequate, and should be replaced. They no doubt served small property; but he had never heard they were not sufficient, except by a reference to the unaccounted-for gas, which was said to be increasing. That, however, was not the case, because the leakage was higher a decade ago, and had fluctuated considerably since. Further, if expenditure were incurred in preventing leakage, it would be remunerative, because gas would be saved. Regarding the 10 per cent., Counsel remarked that it did seem a little ungracious on the part of the Corporation to say that if the Parliamentary Committee intended the Company to have it, it was their bounden duty to see it was so stated in the Act. The Committee asked the Corporation Counsel whether the Lands Clauses Act covered the 10 per cent.; and on being told that it did, they passed the clause with the Lands Clauses Act in it. It was therefore clear that the Committee intended to allow it in full. Then as to what the meaning of expenses of re-investment might have been in the minds of the Parliamentary Committee, Counsel was ignorant; but he put it that the loss of income arising from capital lying idle for two or three months was part of such cost. On the whole, therefore, he insisted that the main position taken up by the Company was untouched. In every view of the situation, they had an ample surplus above what would be required to pay the £4078 practically in perpetuity, even if they did spend the £5000 suggested. Surely it showed that the Company occupied a unique position, and gave him good ground on which to defend the multiplier of 30·77. To say this number of years had never been claimed before, was not absolutely true, though he did not know how often it had been. If the Umpire was of the Company's opinion, he would agree that the undertaking was in a very high position of stability indeed; and having regard to this fact, and considering that every year the value of money was likely to increase, Counsel held that 30·77 years' purchase was not any too much to ask. This, used as the Company's witnesses applied it, and adjusting the other figures as they suggested, would give the sum of £133,688 as the value of the concern,

The proceedings then terminated; the Umpire reserving his award.

SUFFOCATION BY GAS IN BELFAST.

Last Wednesday morning, a young woman named Susan Harper, a servant employed at Hinkley House, Maryville Park, Belfast, met with her death under very melancholy circumstances. She retired about the usual hour, in good health, on Tuesday night. On the following morning she failed to rise at the time expected, and it was thought by her mistress that she had overslept herself. She was then called, but no reply having been made, the door of her apartment was opened, when it was discovered that she was lying dead in her bed. In the room there was a strong smell of gas; and the conclusion arrived at was that the girl had been suffocated. A medical man was speedily summoned; but all he could do was to pronounce life extinct. An inquiry into the matter was held on Thursday by the Coroner (Mr. E. S. Finnigan). Evidence of identification having been given, Mr. T. K. Patterson, the employer of deceased, described the circumstances under which the body had been found. He said the room was 7 ft. 3 in. long, 6 ft. 1 in. wide, and 7 ft. 6 in. high; and it was not very well ventilated. The gas-jet was found to be half turned on. He believed the deceased understood turning the gas on and off. Dr. J. Tennant said he had made a post-mortem examination of the body, in conjunction with Professor Lorraine Smith. He saw no marks of violence, and nothing to account externally for death. The body was well nourished, and all the organs were healthy. The blood showed evidence of gas poisoning, which was the cause of death. In answer to questions put by the Coroner, witness said he knew the poisonous element in the city gas was carbon monoxide. It was present in small proportion in ordinary gas, and large proportion in water gas. In a mixture of the two gases, it was found in considerable proportion. From the post-mortem examination, he could see that deceased had been exposed to a fatal mixture of water gas and ordinary gas. Such a mixture was much more dangerous than ordinary gas alone. The Coroner asked whether ordinary gas would be sufficient to cause death in a small room without the other gas. Witness replied that it was very difficult to answer the question without knowing the exact amount of the ventilation and of the escape of gas. He had heard of persons being exposed to ordinary gas and not being poisoned. There was a much greater chance of death ensuing where there was a mixture of the gases. The Coroner said there was no doubt death was caused by gas poisoning. The Jury returned a verdict in accordance with the medical evidence, attaching no blame to anyone.

At the Health Exhibition in connection with the congress of the Sanitary Institute recently held in Birmingham, noticed last week, the following obtained silver medals: Messrs. Burt, Boulton, and Haywood, for their exhibits of coal tar and ammoniacal liquor products; the Cannon Hollow-Ware Company, for enamelled cast iron; Messrs. J. Defries and Sons, Limited, for a Pasteur-Chamberland filter.

EDINBURGH AND LEITH GAS COMMISSION.

The Price of Gas—A New Market for Coke.

A Meeting of the Edinburgh and Leith Gas Commission was held on Monday, the 3rd inst., for the purpose of fixing the price of gas for the ensuing year. Bailie KINLOCH ANDERSON presided.

The TREASURER (Mr. John S. Gibb) submitted estimates of income and expenditure, as follows—Expenditure: Coal, 149,500 tons, as compared with 155,240 tons last year, £79,550, as against £83,490. Gas oil, 2000 tons, as compared with 1373 tons, £6250, as against £4262. Purifying materials, oil, water, &c., £8200, as compared with £7995. Salaries and wages at works, £39,880, as compared with £39,868. Repairs of works and plant, £11,943, as compared with £11,786. Total manufacturing charges, £145,823, as compared with £147,403; distribution of gas, £24,100, as compared with £23,656; management, £9180, as compared with £8258; feu-duties, rates, and taxes, £9800, as compared with £6899; pensions and allowances, £1150, as compared with £1013; law expenses, £50, as compared with £10; accidental damages, £200, as compared with £170; discounts, abatements, and bad debts, £4600, as compared with £4537. Fixed charges: Annuities, £34,560, as compared with £34,703; interest, £9650, as compared with £6768; expenses of mortgages, £600, as compared with £252; annuities sinking fund, £8000, as compared with £7706; and mortgage sinking fund, £2760, as compared with £1944. Total expenditure, £250,523. Revenue: Sale of gas, 1,578,362,000 cubic feet, as compared with 1,557,256,300 cubic feet last year, £232,109, as compared with £228,061; coke, £5800, as compared with £5613; tar and ammoniacal liquor, £13,650, as compared with £12,966; waste lime, £20, as compared with £29; rents of properties and transfer fees, £370, as compared with £377. Total revenue, £251,949, as compared with £247,047 last year. Estimated surplus, £1426. The Works Committee, having considered the estimates, recommended that the price of gas be fixed at the existing figure of 3s. per 1000 cubic feet, subject to the present rates of discount.

Bailie KINLOCH ANDERSON moved the approval of the recommendation. He said they had, in Committee, gone very fully into the estimates prepared by Mr. Gibb. There were some increases in the expenditure. They would observe that general establishment charges were up something like £800. He might say that this included the expenses in connection with the several visits which two or three deputations of the Commissioners had made to England and the Continent. They expected that this increase would more than cover the outlay in that direction. In rates and taxes there was an increase of something approaching £3000. This was mainly on account of the very large surplus—over £14,000—which they had last year, and on which they had to pay not only income-tax but poor rates and city taxes. This was the penalty of their success. There was a slight increase in allowances during the pleasure of the Commissioners. They had several of their staff who had been superannuated—he was pleased to say not many through accidents, but from long service—and they had done what was within their power, in giving them some little contributions to comfort them during their declining years. The estimate under this head had thus been raised from £563 to £700. In annuities there was a decrease. They had redeemed a number of annuities during the year, as the result of which they required £142 less than last year to pay them. This was not, however, the first year in which they had redeemed annuities. As to interest, there was a very large increase—from £6789 to £9650. This was entirely due to their recent purchase at Granton. They took possession of the land early in August, and interest ran from that time. As they knew, they had obtained a temporary loan, at a very moderate rate of interest, till Nov. 11. They would then either issue mortgages, or, which was perhaps more likely, they would get money from the Corporation, at a low rate of interest, to pay the debt. The interest charged here was till May 15 next. The expenses of mortgages were increased considerably. They had estimated on the possibility of their issuing mortgages. In any case, a considerable number of mortgages fell in at May, and would require to be renewed; so Mr. Gibb had wisely made a wide provision for that. The mortgage sinking fund was considerably increased, in view of their issuing mortgages instead of borrowing from the Corporation. In the event of their borrowing, the loan would be repayable in thirty years. If they borrowed from the Corporation, the sinking fund would therefore be increased; but, on the other hand, the expenses of mortgages would be decreased. Taking all in all, they would be about the same, either way. On the revenue side of the account, they had reckoned on an increase of over 20 million cubic feet of gas. This was a very moderate estimate, and they expected that it would be attained. As to residual products, there was a slight increase in the sum to be received for coke. It was the first word he should say in respect of their visit to the Continent, that he thought they had opened up, or possibly might open up, a market for coke there, which would be a very great benefit to them, as they would not be obliged, as they were at certain seasons, to dispose of their coke for very little. He was not at liberty to say to what country they would send it; but if they could complete the arrangement which they anticipated, the yield from coke would be very different in the future from what it had been. Tar and ammoniacal liquor were estimated to yield about £700 more. He was very hopeful that from this source also they would have a much better result. Waste lime was the bugbear of every gas-works. In their recent visits, they found that many places had done away with lime altogether, because they could not get quit of it, and had adopted oxide of iron instead. But they knew that with oxide the purification was not so efficient; and they had therefore kept to lime. Mr. Herring estimated that he would be able to get quit of the waste lime without loss, which was very satisfactory. It was pleasing that they were able to submit estimates which enabled them to continue the price of gas at 3s. per 1000 cubic feet, considering the large increase they had in their expenditure. He brought it before the Works Committee, and he repeated it there, that they had power to utilize the surplus which they carried forward, and which Mr. Gibb always regarded as floating capital. It amounted to £18,000. By using this surplus, they might have been able to reduce the price of gas by about 3d. per 1000 cubic feet. But he thought they would agree with him that this would be a very unwise thing to do at the present time. The larger their floating capital was, the less they had to pay for an overdraft at the bank. Indeed, it was desirable, for the proper working of the undertaking of the Commissioners, that their floating capital should be nearer £50,000 than £18,000. It was, he thought, their duty, instead of expending this money, to try to increase it. In any case, they saved a good deal by having the money in hand.

Mr. J. JAMIESON seconded; and the motion was agreed to unanimously.

PROPOSED NEW GAS-WORKS FOR GLASGOW.

At a Meeting of the Glasgow Corporation Gas Commission last month, a report was presented by Mr. W. Foulis, the Gas Engineer to the Corporation, as to the construction of new gas-works to meet the rapidly increasing requirements of consumers within the city and the suburban areas supplied by the Corporation, and the extension of the residual products works at Dawsholm. The report stated that the question of acquiring additional ground for the purpose of gas-works extension has been under consideration for several years. The necessity for this is shown by the following figures: In 1874 the maximum consumption of gas in 24 hours was 9,162,000 cubic feet; in 1884, 13,700,000; in 1894, 22,853,000; and in 1898, 31,354,000. The annual consumption has increased in the same period from 1305 millions to 4800 millions. The existing works have been gradually extended in order to meet this increase in demand, until there is no further space for extension; and the acquisition of additional land can now no longer be delayed. The most suitable position for a gas-works is on the low-lying ground in the valley of the River Clyde. All the most likely sites in this locality were, therefore, carefully examined, and mining engineers were consulted as to the condition of the underground mineral workings—a consideration of the greatest importance, as a slight subsidence of the ground which would not prejudicially affect buildings of ordinary construction, Mr. Foulis pointed out, might produce serious defects in structures such as gasholders measuring over 250 feet diameter and 150 feet high, which must be maintained perfectly level, and the tanks thoroughly water-tight. A number of sites were examined; and the conclusion ultimately arrived at was that the most suitable spot was the ground lying alongside the Glasgow branch lines of the Caledonian Railway between the Monkland Canal and the main line. The extent of ground which it is recommended should be acquired is about 98 acres on the west side and 12 acres on the east side of the Caledonian Railway Company's branch line—in all about 110 acres. Levels have been taken over the surface of this ground, and preliminary plans made to ascertain its suitability for the purpose of a gas-works. As already stated, the maximum daily demand is 31 million cubic feet. At the present rate of increase, in about 15 years it will be not less than 60 millions. The Dalmarnock works are very inconveniently situated; and appliances for effecting economy in the cost of production cannot be well introduced into these works. The difference in cost of manufacture as compared with the Tradeston and Dawsholm works amounts to not less than £9000 per annum. If the Dalmarnock works were closed, and the manufacture transferred to the new works, a saving of at least this amount would be effected. A portion of the ground at Dalmarnock could be retained as a gasholder station, and the remainder might be sold. It is proposed to design works which, when completed, will be capable of manufacturing 40 million cubic feet of gas per day. The quantity of gas made at the Dalmarnock works is 6 million cubic feet per day. Deducting this there would remain a producing capacity of 34 million cubic feet per day to meet increased demands. This is the minimum quantity which it would be advisable to provide for. The works would be constructed in eight sections, each complete in itself, and built from time to time as required. At the present rate of increase in consumption, the available producing power of the existing works will be completely exhausted within the next three years; and it will take at least that number of years after parliamentary authority is obtained before any new works could be ready for gas manufacture. If, therefore, the recommendations now made be agreed to, it will be necessary to get parliamentary authority in the ensuing session for the purchase of the ground, and for the construction of the necessary roads, railway sidings, and other subsidiary works. It will also be advisable to obtain power to acquire land at Dawsholm for an extension of the residual products works, with the necessary railway connections. The Committee, after deliberation and discussion, resolved that, before making any recommendation to the Corporation, a Special Sub-Committee should be appointed to consider and report on the several matters referred to in Mr. Foulis's statement, and that, with a view to the subsequent determination by the Corporation as to applying to Parliament in the ensuing session for authority to acquire the necessary lands, and to construct the proposed works, the Sub-Committee should report within a fortnight.

At a meeting of the Corporation on Thursday last, Mr. R. M. Mitchell, in moving the approval of the minutes, remarked that the report by Mr. Foulis was the result of several years' consideration by a man in whom they reposed complete confidence; and he did not doubt that it would, when the Committee reported, be very favourably considered by the Council. If the Committee's report was a favourable one, they would be able to go forward and seek parliamentary sanction for the scheme. The motion, after some discussion, was agreed to; approval of the report being delayed till the Sub-Committee's report is received.

Wadebridge Water Supply.—An inquiry into an application by the newly constituted Wadebridge Urban District Council for powers to carry out works of water supply has recently been held by Colonel Hepper, one of the Local Government Board Inspectors. It was explained that the scheme originated with the old governing body, the St. Columb Rural District Council, who proposed to spend £4000 in supplying St. Breock, part of the present urban district, with water. The Wadebridge Council desired, however, also to supply the Egloshayle portion of the district, and for this purpose wished to have the loan increased to £5000. Mr. G. Harris, the Engineer of the scheme, explained the plans, which included the construction of a reservoir, and said there was an ample supply of water for the whole district.

THE PRICE OF GAS AT LEEDS.

Reduction Confirmed by the Council.

The decision of the Gas Committee of the Leeds Corporation to reduce the price of gas to consumers within the city from 2s. 2d. to 2s. per 1000 cubic feet, and to consumers outside the city from 3s. to 2s. 10d., as from Jan. 1 next, came before the Council last Tuesday for confirmation.

Mr. LOWDEN, the Chairman of the Gas Committee, said he had great pleasure in moving the adoption of the resolution, because it meant not only a reduction to the consumer but that gas was to be brought down to a price at which it had never been before. [A VOICE: "No."] True, they knew as a matter of fact that gas at one time was charged to the consumer at the rate of 1s. 10d. per 1000 cubic feet, but reckoned on the same basis the charge from Jan. 1 next would be only 1s. 9¾d. When gas was at 1s. 10d., there were meter-rents to pay; and there was no discount of 5 per cent. The success the Gas Committee had attained, indeed, was greater even than he had anticipated. It might be gauged by the fact that, during the years that gas was at 1s. 10d., coal was much lower in price than at present, the income from residuals was much greater, and the workpeople laboured twelve hours as compared with eight hours now. A few months ago, a resolution was proposed by an irresponsible member of the Committee without the consent of his colleagues for the reduction of the price of gas. The mover did not attempt to justify his proposition, because he was unable to adduce reasons why at that time a reduction should be made. As Chairman of the Committee, he (Mr. Lowden) had no alternative but to oppose the resolution; but the reasons he gave for doing so did not now exist. The position, in fact, was so different from what it was three months ago that the Committee had no hesitation in recommending a reduction. One of his reasons for opposing the former resolution was that then no one knew whether or not there would be a strike of coal miners. This alone was sufficient to cause them to stay their hands. Thanks to the moderation of the miners, as well as to the conciliatory spirit displayed by the coal proprietors, there was now not the slightest probability of a strike for some time to come. Apart from this consideration, the stock of coal at the gas-works was now 32,000 tons—nearly double what it was when the last coal strike took place. Moreover, they had purchased sufficient coal for their needs until Jan. 1, 1900; and it would be found that the cost per ton was not greater for the ensuing year than it had been for the last year. Again, there had been doubts with regard to their income from residuals; but luckily the market value of ammoniacal liquor had since advanced. Another item about which he had been concerned was the disposal of the coke. This had always been an important matter. At times coke had been a drug in the market. They had even had as much as 10,000 tons stacked; and it was only comparatively recently that they had been able to dispose of it. They had also succeeded in disposing of the whole of the surplus coke for the coming winter at a considerable advance over last year's price; and unless something unforeseen occurred, there would be no stacking. In the first six months of last year, the profits amounted to £1623; but this year they had reached £14,638. As soon as he knew this, he made up his mind that there should be a reduction in the price of gas. The reforms and alterations carried out on all sides had led them to believe that they would experience successful results; but in a business of 1½ millions of money, it was impossible to gauge with accuracy what the profits would be. It was sometimes said that the surplus should be applied to a reserve fund; for they employed methods of carbonization which might become obsolete. But it would be noticed that on March 25 last, they had actually a reserve of £31,258; and the sinking fund amounted to no less than £300,280. From this the Council would gather that the Committee were in a sound financial condition. He thought that probably the consumption of gas would be increased now that the price was lowered. It was significant that the only year since 1870 when any decrease took place in the sale of gas was the year when the price was advanced to 2s. 4d. But there were other reasons why an increase might be expected. There had, for instance, been great reforms in the laying of mains. And if any department had needed reform more than another, it had been this. There were at one time many mains altogether inadequate for the supply of gas. Now, however, the mains had been made large enough; and the consumers were able to get all the gas they required. As illustrating the character of the reform instituted, one had only to look at the fact that, instead of 162 pipelayers as last year, there were now 235 employed. As for the prospects of the undertaking, he considered them remarkably good. During the last six months, the Committee had sold 200 cubic feet more gas per ton of coal carbonized than ever before. Then there would be a reduction in the cost of carbonization on account of the new installation of inclined retorts at Meadow Lane. This installation was not intended to supplant existing methods. It was required by the gradual increase in the demand for gas; and an extension of it might be necessary in the future. Another reason why the consumption of gas was likely to increase was the encouragement which the Committee had given to the use of gas-stoves and coin meters. If they could encourage the use of gas-stoves, they would not only promote employment, but would also have the benefit of a purer atmosphere.

Alderman WALKER, in seconding the motion, said there was no reason to be afraid as to the future of Leeds. Within the past six months, they had laid mains in 12 miles of new streets, and had replaced 3½ miles of mains by larger ones.

Mr. BROWN, the "irresponsible member" referred to by Mr. Lowden, made a speech of some length with the object of showing that the Council could well have consented in June last to the reduction in price then proposed by him.

Mr. HENRY said he rose to support the resolution, and to offer one or two criticisms. He took exception to Mr. Lowden's statement as to the quantity of coal, pointing out that the Committee could not store sufficient to last three or four months; and even if that were possible, it would not be worth while. Mr. Lowden said that gas at 2s. per 1000 cubic feet would be cheaper than ever before; but he heard Mr. Lowden declare in that chamber in July, 1893, that gas sold at 2s. 2d. which was 18-candle power was no cheaper than gas of 19-candle power which was sold at 2s. 7d. As to the cost to them of 1-candle power, he was told by a responsible official—the Committee's Engineer—that it meant £20,000.

Mr. LOWDEN: That statement has since been withdrawn.

Mr. HENRY said he had no faith in engineers who acted on the principle of the "Vicar of Bray." He did not suggest that the authority he quoted had so acted; but he should require a formal correction in writing before he discarded figures given to him by a responsible official. He still held, therefore, that there had been a clear saving in that respect of £20,000 a year. The profit last year was £12,232; and the year before, £7000. But if they had been supplying gas of 19-candle power, the two years' profit would have been absorbed in one.

Mr. SMITH thought that people who used prepayment meters were entitled to more consideration. They ought not to have to pay 2s. 6d. for what other people obtained for 2s.

Other members having spoken,

Mr. LOWDEN, in reply, denied the correctness of Mr. Henry's figures as to the cost of an extra candle in the illuminating power. As to the additional charge for prepayment meters, he could furnish Mr. Smith with figures to show that the extra expense of collecting and book-keeping made this necessary.

The resolution was adopted.

GAS AND ELECTRIC LIGHTING AT LOUGHBOROUGH.

Proposed Acquisition of the Gas-Works and Electric Lighting Powers by the Corporation.

Subsequent to the public meeting of the Loughborough Town Council on Monday last week, the members sat as the General Purposes Committee to consider a report from the Gas and Electric Lighting Committee on the subjects referred to above. The Committee stated that they had entered into communication with the Gas Company with a view to obtaining the terms upon which they would sell their undertaking to the Corporation; but the Directors replied that the Company had no desire to enter into negotiations for the sale of their property. The Committee further applied for permission for an Engineer to inspect the works; so that the Corporation might name a price they were willing to give for the undertaking. But the Directors took the usual course of declining to give such permission. The Committee thereupon consulted a Gas Engineer with a view to obtaining his advice upon the advisability of the proposed purchase, and the value which would be likely to be placed on the undertaking in case of arbitration having to be resorted to. The Engineer visited Loughborough, and made himself acquainted so far as possible with the nature of the works externally, and also with the local circumstances which would have any bearing on the valuation, and had now advised the Committee thereon. He strongly urged the Corporation to take steps to purchase the undertaking. The Committee—in view of the fact that the borrowing powers of the Company were exhausted, and that they would shortly have to apply for an extension of their powers—believed that the present afforded a favourable opportunity of purchase which should not be missed. The Committee were advised by the Engineer, whose advice in this respect was confirmed by a Parliamentary Agent, that, in an arbitration under a Bill to purchase, the value fixed would not be such as to render the purchase a burden on the ratepayers. The Engineer said: "With the purchase price determined by arbitration, you may rest assured that you would not be called upon to pay an unfair sum; and although you could hardly expect to make much, if any profit, for a year or two, I am convinced that, with economies which I believe could be effected, such purchase would result in a very short time in considerable benefit to your ratepayers." The Committee, therefore, unanimously recommended the Town Council to empower them to take such steps as might be advisable to acquire the undertaking. In a Bill to effect this object, clauses could also be inserted giving the Corporation the powers required to enable them to establish the electric light. In any case the Committee were of opinion that some of the street lighting, as well as the lighting of public buildings and business premises in the centre of the town, might advantageously be done by the electric light. The Committee therefore also asked for authority to take such steps either by Bill or Provisional Order to obtain electric lighting powers. The report and recommendations were approved.

THE FALMOUTH CORPORATION AND THE GAS AND WATER WORKS.

A Statutory Meeting of the Falmouth Town Council was held yesterday week—the MAYOR (Mr. C. Deeble) presiding—to consider the question of the promotion of a Bill in Parliament for the purchase of the gas and water works.

The MAYOR, in moving the formal resolution, remarked that the period of ten years given by the Gas Company's Act in which the town had the option of taking over the gas-works, was about to expire; and he did not think they would be doing their duty if they did not give the ratepayers the opportunity of saying "Yes" or "No" to the proposal.

Mr. T. G. MEAD, in seconding the motion, said it had been ascertained that Penryn would not be likely to oppose the purchase of the water-works by the Falmouth Corporation. Negotiations had also been opened with the Water Company, and though no information had been received from them of their willingness to treat, it was not altogether unlikely that they might be able to agree with the Company, and avoid the cost of an opposed Bill. As to the gas-works, it was fortunate for the ratepayers, if they decided to purchase, that the rate of increased consumption fell off last year. From 1893 to 1896, the average rate of increase in the consumption of gas was 1,540,000 cubic feet; from 1896 to 1897 there was the remarkable increase of 3,234,000 cubic feet; but for 1897 to 1898, the increase was only 640,000 cubic feet. Such a drop in the rate of increase could not fail to have an influence on the mind and figures of the valuer. They were, he believed, all pretty well agreed as to the advisability of the Corporation obtaining control of the water supply. He thought also a majority of the councillors were in accord as to the wisdom of purchasing the gas-works. His advice to the ratepayers was that they should purchase both.

Mr. W. W. PHILLIPS contended that the ratepayers should have been consulted before an expert was called in or legal assistance obtained. No

member of the Council said a word about this question in his election address. The scheme might be for the advantage of the ratepayers; but he would not pledge himself until he had the will of the people.

The TOWN CLERK: This is the very way in which you can get the voice of the people.

Dr. BANKS regretted that they were not in possession of fuller information, and hoped the Gas and Water Purchase Committee would take pains to prepare a very definite scheme to submit to the ratepayers. He did not know whether Mr. Silverthorne's report of two years ago was to be accepted as still alive. If not, no member of the Council who was not on the Committee had any data on which to form his judgment. Having regard to the altered state of affairs with respect to the Gas Company, they ought to have the expert's report before them. He regretted that the two things were tied together, and that the vote of the ratepayers must be for the purchase of the two undertakings or none. This was a mistake in tactics.

Mr. H. S. MACKENZIE said they wanted the water-works for the sake of the public health, and the gas undertaking because it happened to be a paying concern.

Mr. PHILLIPS said it was a leap in the dark—a risky speculation.

The resolution was carried by 10 votes to 4. The Mayor decided to take the vote of one of the members who was said to be a shareholder in the Gas Company, as the legality of the vote could easily be tested at some future time.

THE DEVONPORT CORPORATION AND THE WATER-WORKS.

Possible Abandonment of the Purchase Scheme.

Owing, it is said, to the difficulty of completing the formalities and preparing plans in time for depositing a Bill next month, the Devonport Town Council have decided not to proceed with the scheme for the compulsory purchase of the water-works until the session of 1900. In the meantime, preliminary stages are to be completed, though the statutory meeting of the Council will not be held until after the 9th prox., when the number of councillors will be increased by the addition of the representatives of a district recently added to the borough. Two deputations waited upon the Council last Thursday—one in favour of the scheme, and one against it. Members of each deputation spoke at length; but the new points made were not numerous. Mr. G. H. E. Rundle, on behalf of the deputation favourable to the scheme, said the only point for consideration was what should be paid to the shareholders in addition to the value of the share capital. It was out of the question to suppose that any premium would be paid on the sums borrowed by the Water Company. Mr. C. W. H. Jago, another speaker on the same side, considered that the Water Committee were justified in withholding the report of the Engineer, because Plymouth would probably oppose the Bill, and would take advantage of any information it could acquire. On behalf of the deputation against the scheme, Mr. R. S. Smith said he was informed that Mr. G. H. Hill, the Water Engineer, had reported against the purchase of the works, and he was an authority more to be relied upon than Mr. Diggle. Turning to the calculations as to the income and expenditure of the undertaking, Mr. Smith said the works were now economically managed. If they came under the control of the Corporation, the working expenses would in three years be £8500 instead of £5800, the present amount. Mr. Whitfeld, the Chairman of the Water Committee, said it was not true that Mr. Hill's report was adverse to the scheme. Mr. A. Stephens, another member of the deputation, complained of the scanty information furnished by the Water Committee, and said the particulars they now had convinced him that the water-works would be a burden on the ratepayers. The Mayor (Mr. W. J. Waycott) promised the deputations that their views should receive the consideration of the Council.

Events have now taken another turn; and it is possible that the scheme will be dropped. Mr. Whitfield, the Chairman of the Water-Works Purchase Committee, wrote to the Town Clerk on Friday a long letter severely criticizing the action of the opponents of the proposal. He says its tendency is to frustrate the scheme, and to so play into the hands of the Water Company as to make any future movement impossible. He continues: "To prevent the disaster which must follow the degradation of this question into a mere party and personal conflict, I have determined to resign my position as Chairman, and to ask you to call my colleagues together, so that I may propose that the resolution of our Committee may be abandoned." The suggestion that the scheme should be dropped has been received with more surprise because the Committee have hitherto expressed satisfaction with the progress which it seemed to have made in popular favour.

Cowes Gas Supply.—An application to the Local Government Board by the Cowes Urban District Council for sanction to borrow £7471 for the purposes of their gas undertaking was inquired into by Mr. F. H. Tulloch, M.Inst.C.E., last Thursday. The Clerk to the Council (Mr. H. C. Damant) explained that the application was made under sections 26 and 27 of the Cowes Gas Act, 1897, by virtue of which the gas-works were purchased for £58,511. Since it had been sent in, the amount had been increased to £7800, which the Council asked power to borrow for forty years. They had every reason to hope that the concern would pay for itself this year. There were at present 878 consumers, or an increase of 138 in the nine months. They had the whole of the public lighting, which was equal to the consumption of nearly 2 million cubic feet of gas, in addition to the private lighting. The manufacture of gas during the first nine months of 1897 was 15,044,000 cubic feet; and for the past nine months, 17,483,000 cubic feet. The net profits had also increased to a more than corresponding extent. In 1896 they were £1951; in 1897, £1849; and in the quarter ending March last, £809. Mr. W. Halliday, the Secretary to the Gas Committee of the Council, having explained the purposes for which the money was required, the Inspector said the Board were quite willing to sanction the whole of the amount; but the Council had better let him know how much they would want in the next two years. The Board were not willing to lend money for anticipated works for a longer period than two years. Mr. A. Thomas, the Manager, having submitted the plans and given evidence, Mr. Fellows, the Chairman of the Gas Committee, expressed the hope that the scheme would have the sanction of the Local Government Board.

ALDERMAN MILES ON THE GAS SUPPLY OF BOLTON.

In the "JOURNAL" last week, brief reference was made to an address delivered by Alderman Miles, J.P., the Chairman of the Gas Committee of the Bolton Corporation, on the manufacture and consumption of gas. He began by giving a sketch of the introduction of gas lighting by Murdoch, and then described the process of manufacturing this illuminant. Having traced the gas from the retorts to the holders, illustrating his remarks by diagrams, he proceeded to furnish some particulars as to the undertaking with which he has been so long identified. He said that in Bolton they had now five gasholders, capable of containing sufficient gas to serve the town for from 24 to 27 hours, supposing they were not continually making and storing gas. They had 243 miles of mains. According to their Act of Parliament, the Corporation were bound to supply gas of an illuminating power equal to 16 sperm candles; but, as a matter of fact, they sent out gas of a quality equal to 18 candles—being two candles better than was distributed in London. Bolton gas was tested practically every hour of the day and night throughout the year. He advised consumers to pay particular attention to their burners, as many of the complaints made as to the quality of the gas were due to defects in these appliances. Therefore he said to consumers: "Carefully select your burner, and do not give it too much work." The Bolton Corporation took over the gas undertaking in 1872, in which year 359 million cubic feet of gas were made. Last year the make aggregated 885 million cubic feet. In 1872, there were 15,000 consumers; and the advance made was shown by the fact that last year they numbered 35,500. The profits made in the Gas Department and handed over in relief of the district rates, since the works were taken over by the Corporation, had aggregated £311,900. He expressed the hope that the undertaking would continue to be a source of great benefit to the ratepayers for many years to come; but he said they must bear in mind that, in future, the profits would have to be shared by a greater number, owing to the extension of the borough boundaries under the Act which took effect on the 1st of October. The output of gas was at present on the increase; but this was due less to the development in domestic lighting than to the augmented use of grillers in the homes of the artisans. No fewer than 5000 of these appliances had been fixed in the houses of the people; and the demand was increasing.

ELECTRIC LIGHTING NOTES.

The Electric Lighting Committee of the Middlesbrough Town Council have adopted the plans and specifications of Mr. Hammond for electric lighting works; and they propose that application be made to the Local Government Board for power to borrow £36,000.

It was decided at the meeting of the Tottenham District Council last Wednesday to apply to the Board of Trade for a Provisional Order to supply electricity within the district, and to oppose the applications that had been made for the purpose by several companies.

The Gas Committee of the Nelson Corporation reported to the Council on Wednesday that the present electric lighting plant is totally inadequate for the demands made upon it; and it was consequently agreed to apply to the Local Government Board for £11,000 for extensions.

The Garston District Council have not yet secured the sanction of the Local Government Board to the borrowing of the £25,000 required for a combined scheme of electric lighting and dust destruction. The Board consider that, if the Council adhere to the proposed combination, they should endeavour to obtain a site farther removed from the centre of a residential neighbourhood than that fixed upon.

The Shipley District Council last Tuesday agreed to apply to the Board of Trade for a Provisional Order to enable them to carry out an electric lighting installation. They did so at the instance of Mr. James Roberts, who seems to have convinced his fellow-members that "ample power could be generated by the burning of refuse not only for the pumping of sewage at the sewage-works, but also to provide electric light." On whose authority Mr. Roberts made this assertion, we have no information; but his fellow-members would certainly do well to inquire a little more deeply into the question.

Questions were asked at last Thursday's meeting of the Hampstead Vestry as to the failure of the electric light one day in the week in the Priory Road. "An accident on the short circuit in one of the mains," was the Chairman's explanation. This little drawback did not deter the Vestry from deciding to extend the street electric lighting at a cost of £2270, and to refer to the Finance Committee the question of raising a loan of this amount. It is interesting to note that the Vestry, after a long debate, passed the following resolution: "That it be referred to the Lighting Committee to consider and report whether a reserve fund should be formed in connection with the Vestry's electric lighting undertaking."

The Elland District Council are not at present favourably disposed towards the electric light. One of the members, Mr. Thornton, tried to persuade his colleagues last Tuesday to take steps to obtain a Provisional Order to enable them to establish electricity works; and Mr. Dyson, who supported him, calculated that something like 1000 lights would be required along the main streets. In opposition, Mr. Spencer argued that electric lighting was 7½ times as expensive as gas; and, to uphold his contention, he quoted from the prospectus of a firm dealing in incandescent gas lights. Other members also opposed the motion on the plea that the question had not been sufficiently discussed in Committee. Ultimately the resolution was defeated by eight votes to three.

Owing to difficulties with reference to the acquisition of a site required for the purpose, the Swansea Town Council have decided to defer the provision of a dust destructor in connection with their electric lighting scheme; and separate plans and estimates for the latter are now to be prepared by their electrical adviser, Mr. Manville. The original estimates were: Electric lighting station, on the low-tension system, £32,470; dust destructor, £11,287; land, £6000—making altogether £49,757. The Corporation applied for power to borrow £60,000, so as to have £10,000 for the purpose of carrying out extensions to more distant places, and meeting contingencies. The majority of the Council do not now appear very anxious to go in for the dust destructor; and it is probable that the loan applied for will be reduced to £42,000.

At the meeting of the Eastbourne Town Council, held last Tuesday, under the presidency of the Duke of Devonshire, the scheme originated by Mr. C. F. Simmons, a member of the Corporation, for utilizing the refuse destructor for the supply of electric light, came on for discussion. Mr. Maude asked whether those members of the Council who were interested in the Gas and Electric Lighting Companies were entitled to vote. The Town Clerk replied that they were not; and seven members then withdrew in a body. An animated debate followed, and it was stated that in respect of public lighting the scheme would yield a profit to the ratepayers of £1500 a year, even after setting aside £750 a year as a special depreciation fund. It was decided to apply for a Provisional Order, and to offer to buy up the Electric Lighting Company's undertaking on fair terms.

The estimates prepared for the projected electric lighting works of the West Hartlepool Town Council appear to have been a little misleading. At last Tuesday's meeting of the Council, Mr. Young inquired whether it was a fact that the estimate for the station was £6000, and if that amount had been increased to £17,000. He thought the Council were being misled, and it was time they were taken into confidence. The Mayor (Alderman J. F. Wilson) admitted that the cost would be in excess of the estimate, and said that Professor Kennedy had been asked to submit other plans. Mr. Sergeant said Professor Kennedy's estimate was £6000; but after the plans had been drawn, the tender sent in was about £18,000. The Committee thereupon returned the plans to Professor Kennedy, with a request that he should prepare plans according to his estimate of £6000. Mr. Robinson held that the Committee had not misled the Council; the station would not cost more than £6000.

Customers of the Cape Town municipal electric lighting works have of late been complaining loudly of the increase in the amount of their bills. The grumblers were certain that they had had less rather than more light, while the accounts showed an increase which in some instances perfectly astounded the consumers. The Electric Lighting Committee inquired into the matter; and they have now given the consumers the comforting assurance that the accounts were all right, and there will be no deduction. The consumers seem, in fact, to have been having the best of the department until recently. Owing, say the Committee, to the irregular working of the meters formerly in use, the energy consumed was not properly recorded, and consequently the Council sustained a heavy loss. At the beginning of last winter (which, of course, is concurrent with our summer), a number of reliable meters were installed, and they are registering accurately the energy consumed. Hence these tears.

The Urban District Council of Worksop had the question of electric lighting under discussion at a special meeting recently held; the proposal before the Council being that they should apply to the Board of Trade for a Provisional Order empowering them to supply electricity. The Chairman (Mr. J. Thornton, J.P.) said he was perfectly satisfied that if a certain Bill [presumably that presented by the General Power Distributing Company] passed through Parliament Worksop would be inconvenienced, and the ratepayers would find their electricity very much more expensive. For this reason he was strongly in favour of the Council providing the town with it themselves. If they did so, they would at any rate retain control over the streets, which, under certain circumstances, they might not be able to do. He moved a resolution sanctioning the application. Mr. Dougill, though not exactly opposed to the proposition, expressed the hope that the matter would be dealt with very carefully, as he did not wish to saddle the town with another white elephant. He thought there were other questions which ought to be considered before that of electric lighting. The resolution was eventually adopted *nem. dis.;* and the Council went into Committee to consider details.

By the casting vote of the Chairman, the Stretford District Council recently resolved to establish and work an electricity installation of their own, and not accept the offer of the Manchester Corporation to supply current on terms similar to those which have been agreed to by Moss Side, Withington, Levenshulme, Failsworth, Droylsden, and Heaton Norris. The decision of the Council has raised quite an indignant outcry among the ratepayers, who are of opinion that it will be years before they can hope to supply electricity at the same price as the Manchester Corporation. The terms upon which the latter are willing to serve the district are: (1) To supply the electric light at the same price as to the citizens of Manchester—that is, an average of 4d. per unit; the highest price being 5d. per unit, and the lowest 1½d. (2) To find all the capital required. (3) To take the lease of the Provisional Order for twelve years; the District Council then to take over the undertaking if they desire to do so, upon payment of the original cost, less depreciation, and without any charge for severance. (4) Manchester to pay all the cost of obtaining the Order. These conditions certainly appear very reasonable; and the ratepayers, in public meeting, have expressed their disapproval of the action of the District Council in rejecting them.

Last Friday evening, the City of London was, to use the words of a popular morning paper, "thrust a century behind the times" by being deprived of the electric light for about twenty minutes. The failure occurred shortly after six o'clock; and many of the shops in the principal thoroughfares were plunged in darkness. Where gas had been retained on the premises, it was promptly brought into use; in other cases, candles and oil had to be resorted to—bicycle lamps being utilized in one instance. In the restaurants, some funny scenes were witnessed. After an anxious interval of twenty minutes, which to the expectant tradesmen (particularly those who had much valuable property in their shops) seemed an hour, the light was restored. The district affected is served by the City of London Electric Lighting Company; and the accident is stated to have been caused by the fusing of bobbins on the armatures of two of the dynamos. It is an old saying that "Misfortunes never come singly." Curiously enough, there was a failure of the light on Friday at Norwich—all the lights in the city being extinguished. The proceedings of the Guildhall Court of Record were interrupted; but candles were procured and the sitting was continued. The Post Office work also had to be carried on by the aid of the same illuminant. Most of the shops closed their doors; but in those which remained open candles were resorted to. Where gas was available, it was quickly brought into use; and the incandescent burners at the Gas Company's office sent forth quite a blaze of light. The Engineer of the Electric Lighting Company (Mr. F. M. Long) was at the works when the accident happened, and promptly took steps to repair the mischief; the whole staff of workmen being sent out to examine the cables and apply tests at the manholes. The damaged portion was located shortly before midnight. It is thought that a slight settlement in the ground within a few yards of the station disarranged a culvert, and occasioned short-circuit. The faulty part was cut away, the system quickly brought into working order, and the light restored.

At last Wednesday's meeting of the St. Pancras Vestry, Mr. Albert E. Pycraft, the Chief Clerk, presented an interim revenue account of the Electric Lighting Department for the six months ending the 30th of June. It shows that the total revenue for the period amounted to £17,408, which is an increase of £3088 over a similar period ending June, 1897. The expenditure on trading account was £11,556; leaving a surplus of £5852 to meet interest charges, &c., and instalments of loans, amounting together to £4686. The net result shows a profit of £1166, to which is added that brought forward from last year—£1717; making a total on June 30 of £2883. Unfortunately, this rosy state of things is rather spoilt by the subsequent announcement that the recent reductions in the charge for supply have resulted in an unpremeditated loss. The report states: "It will be noticed, upon reference to the accounts published at June, 1897, that the 6d. supply produced at that time £10,284 19s. 6d., and at June, 1898, £10,431 8s.—an increase of only £146 8s. 6d. The introduction of the maximum demand indicator and other rebates, has resulted in an actual reduction of income of £800. It is important to give due consideration to this result, in view of the fact that at the 30th of June only 163 consumers had adopted the demand indicator, of whom about half received a rebate—this being on the basis of a three-hour maximum." Those regrettable accidents and explosions are now beginning to make themselves felt financially, for we read that "the largest item of expenditure is that charged under the heading of 'repairs, mains, &c.,' amounting to £2822 0s. 11d., which includes exceptional charges in connection with the re-arrangement and alterations of the public lighting mains, amounting to £1954 and £168 1s. 7d., in connection with changing over the pressure of supply to 220 volts." Nevertheless, Mr. Pycraft says that, "having regard to the exceptional charges included in the accounts for the past half year," he ventures to consider the result "eminently satisfactory."

The development of the Manchester Corporation electric lighting works is making tremendous headway. At present, the generating plant at the Dickinson Street station represents rather more than 6000-horse power; and within a short time two engines, each of no less than 2500-horse power, will have been added. When the generating strength has been brought up to 11,000-horse power, the station will rank second to one only in England—that owned by the City of London Electric Supply Company. The situation at the Dickinson Street station is convenient; and the Department fortunately owns land upon which can be placed as occasion serves other engines equal to 12,000 to 15,000 horse power. The station may accordingly be developed into one with about 25,000-horse power. This, however, is comparatively insignificant beside the proposals which the Electricity Committee have under consideration, in view of the requirements of Manchester with regard to electric tramway traction and street lighting. They will in the near future establish near Philips Park an electric generating station provided with machinery which will work up to about 100,000-horse power. At present the area covered by the Corporation electric supply is, in round figures, 4 square miles; but under the coming extension of electric power and light, the Corporation have before them the problem of how to supply something like 40 square miles. With the Philips Park and the Dickinson Street stations working conjointly, electric energy will be developed sufficient to extend anywhere within a radius of 12 miles. Levenshulme, Moss Side, Withington, Heaton Norris, and the other suburbs will be within the borders of the area of the supply. Incidentally, it may be stated that there are now in the city 2200 users or consumers of the electric light supplied by the Corporation, that over 200,000 8-candle lamps will be the working consumption this winter, and that some 150 applications for the light are in the hands of the Department. The Electricity Committee and their Engineer (Mr. C. H. Wordingham) are therefore particularly busy.

GAS v. ELECTRICITY AT ADELAIDE.

Readers of the "JOURNAL" will doubtless remember that the Corporation of Adelaide recently invited tenders for alternative schemes of electric lighting for the city; and the terms submitted were given in our issue for the 27th ult. A large portion of the public lighting, however, is now being done by the incandescent gas system, under a contract entered into by the Corporation with the South Australian Gas Company for supplying 880 lamps for five years from Sept. 1, 1897. This matter was alluded to by the Chairman of the Company (Mr. J. Acraman) when moving the adoption of the Directors' report, noticed a fortnight ago, at the recent annual meeting. He characterized the event as the chief one of the year, and said the price was a favourable one to the Corporation; the amount of £4100 being particularly low, considering the great size of Adelaide in proportion to its population. It required 53½ miles of mains to light the streets; so that the lamplighters had to travel 107 miles a day, or 40,000 miles a year. The price was £4 10s. per ordinary lamp; and the coal cost at least 50 per cent. more than it did in Sydney. The charge in that city for lighting was £4 5s. per lamp. In Adelaide there were 900 public lamps, and in Sydney 10,000; so that it was evident the Corporation had a favourable contract. The number of lamps in Adelaide for the great mileage of streets was quite insufficient whatever kind of lamp was adopted. In Liverpool they had 80 Welsbach burners to every mile of streets lit; but in Adelaide there were only 18. It had been admitted by electrical experts who had communicated with the Company that an arc lamp of 200-candle power was required for 100 yards of street; and if electric lighting were adopted, 941 arc lamps would be required. The Brush Company, in their tender, stated that each of these, at 5d. per unit, would cost £45 per annum; so that it would take £42,000 per annum to light the city by means of electricity, as against their own modest £4100. When the advertisements appeared, the Directors were approached by more than one electrical concern with the idea of going in for the business. The Board, after due consideration, unanimously decided not to embark in it. Having referred to the Welsbach Gas Company's new burner, which he pointed out would obviate damage to mantles through vibration, he

mentioned that, in a recent address delivered in Manchester, Sir Henry Burdett, the Chairman of the Welsbach Company, stated that, taking four hours a day as the average lighting period in the year, or 1500 hours a year, 90 units of electricity were required to produce a light of 16-candle power for 1500 hours, and that therefore 270 units were required to produce a light of 48 candles for 1500 hours. This, at a cost of 5d. per unit, would mean £5 2s. 6d. per year. At the present price of gas, a Welsbach burner giving 60 or 70 candle power light would cost £1 15s. per year of 1500 hours. In Sydney they had lately lit the new Victoria Markets with incandescent lights; and he was informed that it was the finest piece of lighting in all Australia. In Melbourne, the Melbourne Club and the "Argus" office had discarded electricity for incandescent burners. The Hon. S. Tomkinson, in seconding the motion, said the Directors were rather too hasty in making such a low-priced contract as they did with the Corporation; and he was sorry that this body, despite the concessions granted it, was now negotiating with electric lighting concerns for the illumination of the city. This was scarcely fair, considering the Company's contract had four years more to run. The motion was carried. In reply to a question, the Chairman stated that for years the Port Adelaide Corporation had not had a contract with the Company, and owing to this they had paid more for gas than they otherwise would have done, while they had thrown away £1500 of the citizens' money. In August, 1895, the Company offered to enter into a contract with the Corporation for five years at £6 per lamp per annum, or for seven or ten years at £729 per annum. The estimated expenditure of the Port Adelaide Corporation for 1899 for street lighting was £1000; so that they were going to spend £270 a year more in securing electricity.

The remarks of the Chairman brought out a letter to one of the papers from Mr. F. C. Howard, the Manager of the South Australian Electric Light Company, who explained, in reference to Mr. Acraman's statement that it would cost £42,000 per annum to light the city with electricity as against £4100 with gas, that in October, 1897, his Company offered to light Adelaide with 220,000 nominal candle power each night for £4500 per annum, and that the Gas Company offered to provide 64,890 nominal candle power for £4566 per annum; while the City Surveyor recommended a scheme of electricity and gas combined to produce 170,000 nominal candle power. With reference to the Welsbach burners, he said Mr. Acraman forgot to state that the makers claimed that the new mantle was applicable to electricity as well as to gas. He concluded by challenging the Chairman to satisfy any independent umpire mutually chosen that gas in England was making equal progress with electricity, the forfeit for failure being the payment of £10 to the Children's Hospital; Mr. Howard to pay a similar amount if his opponent were successful. Mr. Acraman declined to accept this absurd challenge; pointing out that it would involve a commission to England and some delay and expense, which he was not prepared to undertake. He said, however, that, if Mr. Howard wished it, he could furnish a long list of electric concerns which had had to wind up or write off large sums from their capital. With regard to the other points in the letter, he said: "Though the sums that were quoted by Mr. Howard are correct, he omits to say that the 220,000 nominal candle power which he mentions would have ceased at midnight, after which there would have been only 30,000 nominal candle power. As regards street lighting generally, I said the number of lamps in Adelaide was quite insufficient for the great mileage of streets, whatever kind of lamp was adopted, and that electrical experts who had been in communication with the Gas Company admitted that for efficiently lighting streets arc lamps should not be more than 100 yards apart. To do this, 941 lamps would be required; and, having had no experience of the cost of such, I named that quoted by the Brush Company in their tender, £45 per lamp, which works out to £42,345—of course, a sum far beyond Adelaide finances."

THE DRY WEATHER AND WATER SUPPLY.

The London County Council and the Water Question.

At the Meeting of the London County Council last Tuesday—the first after the usual summer recess—the question of the supply of water in East London was under discussion. Mr. T. M'Kinnon Wood occupied the chair.

Mr. W. Crooks (Poplar) submitted the following motion as a matter of urgency: "That, in view of the existing difficulty in obtaining an adequate supply of water in a large portion of the County of London, it be an instruction to the Water Committee to forthwith submit its proposals with regard to legislation affecting the water supply in the ensuing session of Parliament." In moving the resolution, he said the Council knew the urgency of the case. They had been told over and over again that the Water Companies were quite capable of minding their own business, and of giving the people of London a full, adequate, and, above all, a pure supply of water. He asserted that it was not only inadequate, but impure. The water when freshly drawn had often a film upon it; and recently, in his own house, they had a worm 3 inches long delivered through the tap. If the Council could only realize what it meant to be without water for 20 hours out of the 24 in the crowded courts of the East-end, they would feel as strongly on the subject as he did. He was tired of the promises of the Companies and the platitudes of the Government; and he appealed to the Council at once to take the matter up. He hoped the Council would make itself a fighting power on the water question, and would go for a full, efficient, and pure supply from Wales, or from any other source that was capable of giving a supply. He trusted that the Council would compel the Companies to act up to the spirit of their obligations, and repeal the section of their Acts which enabled them to charge for what they did not supply. They had in their hands the lives of the people of London, who were looking to the Council for help. He trusted the Water Committee would not hesitate for a moment to move in this matter.

Mr. Stuart, M.P., seconded the motion. He asserted that the present distress in the East-end was due to the culpable neglect of the East London Water Company to carry into effect the legislation which they themselves promoted for the purpose of avoiding a scarcity of water. The Local Government Board seemed to put itself into the hands of the Company by backing up the unfounded charge against the people of wasting the water. Only last year the Company obtained parliamentary sanction to connect their mains with those of other Companies in case of urgency; and yet they failed, until a few days ago, to act upon that power. The speaker proceeded at length to show that there was no ground for the allegation that the famine was due to the action of the Council in opposing the Company's Bill of 1893. The loose statements of the Company induced Lord Balfour's Commission to report that the waters of the Thames and Lea would afford a sufficient supply of water for London. This had since been disproved; and it was now no longer a question of storage, but of a further supply. It was not until after a long series of warnings that the East London Company had been brought to acknowledge that fresh sources were necessary beyond the valley of the Lea. The Council would now have to take into account the question, not only of making up for the delinquencies of the Water Companies, but providing such a future supply as would meet the growth of population, and become a valuable asset to the Council.

Mr. Beachcroft said that no useful end could be obtained by attacking a particular Water Company. He was prepared to support the motion, but desired to see some practical point given to it. The Council had for years been unable to make up their minds as to supplementary sources of supply, although they had had elaborate surveys and reports before them. The motion was somewhat bald as it stood; and, in order to strengthen it, he would move to add the words: "And also to obtain the opinion of an engineer as to what works are required to provide for connecting the mains and works of the several Companies for use in cases of urgency."

Mr. H. P. Harris seconded the amendment.

Mr. M'Dougall felt he should not be doing his duty as a representative of the Council upon the Thames Conservancy Board if he did not say something about the general aspect of the Water Companies in the weeks to come. Lord Balfour's Commission stated that it was undesirable that water should be taken from the Thames unless at least 200 million gallons were flowing over Teddington Weir. They knew that the Lea was in a very disastrous condition, and, unfortunately, the Thames had become very much like it. On the 1st of July, the amount of water passing over Teddington Weir was 320 million gallons. But the average of the month was only 169 millions, which was reduced in August to 144 millions; and the figures for September, which had yet to be verified, but which he believed were quite correct, were only 86 millions. On one day, the quantity was 80 millions; on four days it was but 65 millions; and once it did not exceed 50 millions. Not only had the bulk of water diminished, but the Companies were taking from the river more than their statutory quantities. The Lambeth Company, for instance, were taking 6 million gallons more than their limit. Since the September figures had been prepared, there had been practically no rain; and if there were to be a few days' rain, it would only stir up the shallow water in such a way as to render it anything but pleasant for drinking. The Thames had never been so low as it was now; and this constituted a serious danger for London.

Sir A. Arnold said that no stronger condemnation of the Water Companies could be passed than that contained in the amendment; for it actually suggested that, in this awful crisis in the history of the London Water Supply, the Engineers of the Companies had not made every possible effort to meet the wants of the people. He felt certain the Council would unanimously reject the amendment.

The debate was adjourned.

The Position at the East-End.

In the article on "Water and Sanitary Affairs" last week, reference was made to a statement by Dr. Sedgwick Saunders, the Medical Officer of Health for the City of London, relative to the former water supply to the City. It was contained in his recent report to the Sanitary Committee of the Corporation on the progress of events in connection with his department during the vacation (July 30 to Sept. 17). Of course, the condition of the water supply at the East-end was dealt with; and Dr. Saunders pointed out that the difficulties which had arisen in consequence of the enforced suspension of the constant service of the East London Water Company had not depended exclusively on a diminished supply, but rather on the absence of the means of proper storage of water for domestic and sanitary purposes. The abolition of cisterns in houses of any class would, he said, be bad enough, but in those divided into tenements for the occupation of the poor, the want of such receptacles involved an amount of suffering wholly inconceivable by persons possessed of such conveniences. It was a well-known fact that, whereas in the area supplied by other Companies the existence of cisterns in houses was practically obligatory, the system was objected to by the East London Company. To what extent the abolition of such receptacles for storing water was responsible for the misery inflicted upon the poorer customers of the Company need not be discussed. It was sufficient to say that when the day of reckoning came, the Company would have to show better reasons than had hitherto obtained for their actions in this respect. The area supplied by the Company in the City affected 133 houses, with a population (day and night) of 1709. Of these houses, 77 were without cisterns, and 33 had constant service, 43 were tenements, and 12 were empty premises. The water was turned on three times a day—viz., 6 a.m., 12 (noon), and 6 p.m.—for two hours each time; and when it was remembered that a very few years ago the New River Company's general supply to the City was only on for one hour a day, and often less, it seemed an absurdity to apply the term "water famine" to the East of London, more especially as the Company's representatives averred that the present supply equalled 24 gallons per head—an amount much in excess of that furnished to some of the most important provincial towns. The 77 houses without cisterns had no means of flushing the drains and water-closets when the water was turned off; and some of the latter were in an unspeakable condition. Dr. Saunders remarked that, in advocating the use of cisterns, it must not be inferred that a direct supply from the main for drinking and cooking purposes could be dispensed with. No cases of infectious disease had been reported from the district in the City during the vacation; and the health of East London compared favourably with that of the Metropolis generally. He had carefully analyzed the water of the East London and New River Companies, and, from a chemical point of view, the condition of the Company's supply in its present state was purer than it was in April, 1897, and as wholesome as the latter Company's water examined within a few days of the former under precisely the same circumstances as to supply and weather.

Owing to the continued absence of rain, the water consumers in East London still suffer inconvenience from the compulsory continuance of

the intermittent supply, though fortunately the health of the general community has been well preserved. At the present time, the East London Company are not drawing any water from the Lea, and are still relying on the assistance of the other Companies. It will be remembered that, in the course of Mr. Chaplin's reply to the recent deputation organized by the Social Democratic Federation, he stated that the Company had produced a scheme for increasing their supply to the extent of 16½ million gallons per day. The additional water will be provided in the following way: Connection with the Southwark and Vauxhall Company, 5 million gallons; assistance from the New River and Grand Junction Companies, 6 million gallons; supply through the Thames main by arrangement with the Grand Junction Company, 2½ million gallons; and from wells, 3 million gallons. These additions will suffice to carry the Company through the period of stress without relying upon the Lea at all. The quantity of water they will require daily will be about 46 million gallons; and it will be made up as follows: Wells, River Thames, and reservoirs, 10 million gallons each; new sources, 16½ million gallons—total, 46½ million gallons. With regard to the wells, five new ones are in course of construction. They are 12 feet in diameter, and are driven into the chalk 200 or 300 feet. One of these is nearly ready for use, and will serve as an auxiliary to the existing deep well at Lea Bridge. The next is also in an advanced stage of construction, and is situate at Tottenham. The machinery is being fixed, and the pumps will be in working order before Christmas. A third well is at Ponder's End, a fourth at Waltham, and the fifth at Old Ford. The Engineers of the Company are now engaged on a scheme for increasing the Thames supply. At present, the Company have power to take 10 million gallons of water per day from the Thames, but as they also draw about 2½ million gallons from the springs at Hanworth, in the neighbourhood of Sunbury, they are unable to take full advantage of their authorized intake from the Thames, for the reason that the 36-inch main connecting the works at Sunbury with the reservoirs at Waltham will not carry much more than 10 million gallons a day. The idea is to divide the main at some convenient spot on its route, and, by erecting new pumping machinery, to increase its carrying capacity by some 25 per cent. In this case the Company would be able to take their full share of the Thames water, and utilize the Hanworth springs to the utmost extent.

Last Friday afternoon, a deputation of representatives of various religious, trade, political, and friendly societies of the East-end waited on the Water Committee of the London County Council for the purpose of setting forth the serious condition in the East of London in consequence of the scarcity of water. The Chairman of the Committee (Mr. W. H. Dickinson) presided. The deputation was introduced by Mr. Stuart, M.P. Mr. H. R. Taylor, Secretary of the Water Consumers' Defence Association, dwelt on the general state of affairs caused by the absence of water in the district, and referred to the remarks of the Chairman of the East London Water Company at the meeting on the previous day. Although Mr. Banbury had said that his Company were giving a supply of 24 gallons a head daily, he would remind the Committee that this included the water supplied for the roads and factories, so that the statement was absurd. The supply given by the Company was ridiculous when compared with that in New York, where 84 gallons were allowed daily, and in Aberdeen, where the inhabitants received 60 gallons. Owing to the spread of sanitary ideas, and to the disastrous results which had attended the present water famine, it was obvious that the time had come when the Central Authority of the Metropolis should provide a proper supply of water. The Rev. J. E. Hands also urged the importance of immediate action on the part of the London County Council. Parliament, he said, had given the Water Company power to provide a constant supply of pure and wholesome water, but up to the present they had not done so. It was the business of the Company to provide against temporary shortages. In 1897, they were authorized to make connections with other Companies' mains; but no steps were taken to obtain water from other systems until the deficiency became acute. Against the assertion of the Company that householders should have cisterns, in spite of the condemnation of them by the sanitary authorities, he desired to point out that if the cisterns were there the Company would be unable to fill them, and a breakdown even worse than the present one would result. As it was clear that they had failed to carry out their contract, he considered they should be indicted by the Council in the Law Courts, in the interests of the public. Mr. Taylor produced a bottle of water which was very discoloured, and, in answer to the Chairman, stated that he had drawn it from his pipe the previous day. He added, in reply to a member, that it was not always like that, for if it had been they would not have survived. The Chairman briefly addressed the deputation, and said that their statements would be fully considered by the Committee. To a large extent the Council were prevented from action by the Water Commission who had been sitting for upwards of a year. They would soon resume; but the Council were not sanguine of any good results. It was stated that the bottle of water handed in by Mr. Taylor would be analyzed by the Council's Chemist.

The Position in the Provinces.

"If there is any consolation in contemplating the misfortunes of others, East London consumers already have it in abundance. Many country places are absolutely waterless, and have to fetch every drop from a distance of several miles; while the shortage in the large towns in the Midlands has assumed a very serious aspect." Such is the position of affairs in the Provinces as succinctly described by the able special correspondent of "The Times" who has been investigating the water question at the East-end. He points out that even Leeds, which lies outside the area of severe drought, and normally has the largest supply of all the great provincial towns in England, has been placarded with notices peremptorily forbidding the use of water for washing windows and doorsteps, and similar purposes, under a penalty of £5. He cites this as an instructive illustration of the advantage of having a public water authority which can enforce economy with a heavy hand when the public interest requires it. "One shudders to think of the indignation meetings and the denunciations that would ensue if a London Water Company dared to take such a step; and yet the Leeds people pay their water-rates all the same, whether they get their full supply or not." He adds that perhaps the aggrieved Londoner may find some balm in the reflection that even municipal engineers have "miscalculated" their resources, and that the consumer has to suffer without redress. In the Rotherham Town Council last Wednesday, a recommendation from the Water-Works Committee was brought up that the water should be no longer turned off each night, but that the supply should be given in full to the borough as hitherto, whereupon Mr. Cox moved an amendment to the effect that the water be turned off between 11 p.m. and 5 a.m. He said there were only 20 days' supply in the Ulley reservoir, and the quantity being taken from the Sheffield mains was 500,000 gallons per day, whereas what they should take was 300,000 gallons. If this went on, it would increase the cost of the water to an enormous sum; and he thought, in the interests of the ratepayers, there should be economy. To prove what the saving would be, a test was taken on the previous Sunday night, and between 11 p.m. and 5 a.m. there were no less than 82,000 gallons of water consumed. How did this loss occur? There were 17 public urinals where water was running during the night, apart from leakages in other ways. There was great need of inspectors to detect leakages and to prevent the enormous loss going on. He was in favour of giving a full supply as soon as circumstances would permit after rain had fallen. Mr. Gummer contended that, as the ratepayers paid the water-rate, they had a right to a full supply at all hours. There was abundance of water in the Sheffield mains, if they would pay for it; and the Corporation had entered into a bargain with the Sheffield Corporation to obtain it. He did not think the health of the town should be jeopardized by the water being turned off during the night. The voting on the motion and amendment being equal, the Mayor (Alderman Neill) gave his casting vote in favour of the latter.

The Rev. F. C. Clutterbuck, writing from Culham Vicarage, Abingdon, to "The Times," gave the following account of the condition of a well sunk into the upper greensand at Long Wittenham, Berks. He wrote six months ago expressing his fear that the water supply in many parts of the country would be short during the summer of this year; and this has, unfortunately, proved only too true. He based his prediction on the state of this well, which in a record of measurements beginning with 1868 had always shown a rise of water in the first three months of the year. In this year no rise had taken place; but, on the contrary, the water had continuously fallen, and at the end of last month the well was very nearly dry. He had never known it before with less than 7 or 8 feet of water during the middle six months of the year. He wrote: "The drought of the past summer has aggravated, but has not caused, the short water supply, for we have had such droughts before. It is due to the dry time from October, 1897, to April, 1898. The percolation into the deeper water-bearing strata during the six months from April to October is almost *nil*. This is a fact of which many people are unaware. In proof of this, I may evidence the measurements of the well in the year 1891: The well was exceptionally low on Jan. 1; but it rose 2 ft. 9 in. by the end of March. From April 1 to Oct. 1, 14 inches of rain were registered; and yet the well kept continuously falling. October was a very wet month (more than 6 inches of rain fell in the month); but the well did not begin to rise till the middle of the month; and then it rose very rapidly. This year only 7 inches of rain has fallen from April to the present time. It will take, therefore, quite 10 inches of rain, or more, to affect the deeper springs. In proof of this, I may quote the year 1896, in which the summer drought up to Aug. 19 was as bad as this year. The weather broke then, and from that date to the middle of October we had 10½ inches of rain; and it was not till then that the well began to rise. There has been a great outcry about the water supply in the East-end of London; but, as Mr. Chaplin lately said, there are many parts of the country which are worse off than they are. I have been told that on the Oxfordshire Hills people are paying for water by the pailful."

The present state of the Bradford water supply is arousing grave apprehensions; and it is feared that the reservoirs will before long be practically exhausted unless there is a heavy rainfall. Since July, the service has been restricted to twelve hours; and owing to the continued drought, the supply was to be further curtailed yesterday to eight hours. In notices enforcing the necessity for the utmost economy, the Water Committee of the Corporation express the hope that, with the co-operation of the public, they will be able to avert a stoppage of the supply.

Sales of Stocks and Shares.—Last Tuesday, Messrs. Penney and Clark offered for sale, in accordance with instructions received from the Directors of the Portsmouth Water Company, 1500 £5 shares, being the first portion of the new 5 per cent. capital which the Company have lately obtained power to raise. The shares were put up in lots of five, and were sold at the rate of £7 to £7 5s. per share. The total amount realized was £10,615; being a premium of £3115.

Mysterious Underground Fires at Sunderland.—A mysterious and extensive underground fire was reported at the meeting of the Sunderland Rural District Council last Wednesday. The sewers at Grangetown are in a very heated condition, and water-pipes are also affected—the drinking water coming warm from the taps. The Surveyor has been instructed to examine and report upon the outbreak, which, it is feared, will be extinguished only with great difficulty. Since the great conflagration in July last, there has been quite an epidemic of fires occurring almost daily in Sunderland; and the Corporation are making public trials of fire-engines from leading firms.

Gift of a Village Water Supply.—The village of East Ogwell, in South Devon, has received from Mr. D. R. Scratton, a local landowner, the gift of an excellent supply of water. Mr. Scratton's idea was to commemorate the Diamond Jubilee; and to ensure that it might be held in lasting memory, he carried out, at a cost of about £3000, water-works which promise to afford an abundant supply under all circumstances. Formerly the village was dependent on questionable wells from which the water had to be carried a considerable distance. Mr. Scratton employed Mr. Leicester Gataker, the water diviner, who indicated that water would be found in a hill about a mile from the village; and he undertook to provide it on the principle of "no water, no pay." A well 94 feet deep has been sunk, and a supply of from 8000 to 10,000 gallons a day has been found. The water is pumped by a windmill into a reservoir capable of holding 40,000 gallons, whence it is conveyed in pipes to the village, to all the farms, and to troughs placed in the fields for cattle. Mr. Scratton formally handed his gift over to the village last Thursday, when Mrs. Scratton turned on the supply with a gold key, which was given to her as a memento of the occasion; while an address was presented to Mr. Scratton. Though this was the formal recognition of the gift, the water has been actually supplied for several months, and has been a great boon during the drought.

THE PROJECTED WELSH WATER SUPPLY SCHEME FOR LONDON.

The Report of Sir B. Baker and Mr. G. F. Deacon.

The last annual report of the London County Council contains, as would naturally be expected, a reference to the subject of the water supply of the Metropolis. The principal feature of the remarks made is an allusion to the important report presented to the Council early last year by Sir Benjamin Baker, K.C.M.G., and Mr. G. F. Deacon, M.Inst.C.E., on the London Water Supply. The report is the result of a reference made to them by the Council on the 19th of June, 1896. They were requested to consider the detailed proposals, plans, and estimates contained in the report of the Chief Engineer (Sir A. R. Binnie) dated June 8, 1894, in connection with his scheme for obtaining water from the valleys of the Usk, Wye, and Towy, and their tributaries,* and to advise the Water Committee as to their suitability and sufficiency or otherwise. They were further requested to report on the question of the practicability and the cost of carrying out schemes of storage for providing 200, 300, and 400 million gallons of water per day respectively from the Thames, on the lines of the suggestion in the report of the Royal Commission; also, taking into consideration the whole of the circumstances of the case, and having regard to the increasing rate of consumption per head, to give their best advice to the Council as to whether it would be more advantageous to bring into London from the proposed Welsh sources than from the Thames the quantity of water, over and above that at present supplied, which will be required for the supply of the population of 11¼ millions, as estimated by the Royal Commission. The following further question was also proposed, upon which, if Sir B. Baker and his colleague thought it expedient, the Committee expressed a desire to have a short preliminary report: Whether in their opinion there is any other source of supply for the Metropolis which presents such *a priori* advantages over either the scheme proposed by the Engineer of the Council or the suggested scheme of storage in the Thames Valley, as would justify the selection of such other source in preference to both of the last-mentioned schemes. The Engineers in due course presented their report, and it has been published, although, pending the sitting of the Royal Commission on Water Supply, the Water Committee have deferred its consideration. We gave in the "JOURNAL" for the 13th ult. (p. 597) the general conclusions of the report; and we now purpose dealing with the document itself.

The Engineers had placed before them the report and evidence of the Royal Commission; notes of evidence and speeches in the case of the Staines Water Bill (Session 1896); all the reports of the Chief Engineer relating to the Staines scheme and to the proposed Welsh supply; and all plans, sections, estimates, and rainfall observations which he had made since 1890, as well as the various reports of the Water Committee. In addition to these documents, they considered the report and evidence of the Royal Commission of 1869 (the Duke of Richmond's) and numerous other papers bearing upon the question of whether a better source of supply could be found than either the scheme proposed by the Chief Engineer of the Council or the suggested scheme for storage in the Thames Valley. They had thus an almost overwhelming mass of evidence and suggestions to deal with in considering the history of the water question up to the date of the report; but they say the investigation was instructive as showing that, owing to increase of engineering experience and the progress of science generally, many of the conclusions of the earlier inquirers demand important modifications, and that works which in the earlier days would have been considered by high authorities as of startling boldness, would now be accepted without comment as very ordinary and obvious affairs.

On the 7th of August, 1896, Sir B. Baker and Mr. Deacon, accompanied by the Chief Engineer and his assistant (Mr. Seymour Rumble), commenced their tour of inspection by proceeding from Abergavenny to Brecon; noting on the way the general features of the hills and streams and the proposed routes of the intercepting conduits to convey the rainfall to the Llangorse reservoir. On the following and subsequent days they made a thorough examination of the whole of the sources of supply proposed by the Chief Engineer. After gauging the flow of the Usk at Brecon, they proceeded to inspect the proposed site of the eastern dam of the Llangorse reservoir, and found it unexceptionable as regards quality of rock foundation and in other important respects. Their next work was to thoroughly examine the alternative sites proposed for the dam of the Usk (compensation) reservoir; and they found that no engineering difficulty would arise in carrying out the proposed works.

The route over the hills from Llangorse to the Yrfon and Towy afforded a fine general view of the whole country, and confirmed the opinion expressed by the Chief Engineer as to the facilities afforded by the district for the construction of reservoirs which would be amply supplied with pure water from the neighbouring hills. The Engineers first inspected the site of the proposed dam and tunnel for diverting the upper waters of the Towy into the Yrfon; then proceeded to look into the conditions under which the compensating reservoir at Ystradffin would have to be established; and, lastly, inspected the site of the proposed great reservoir itself. In their opinion, no engineering risks or contingencies apply to any of the proposed works; but the extensive railway and road deviations involved will require very careful consideration and negotiation to minimize opposition from those locally interested therein.

The Engineers then proceeded to inspect the proposed sites for the Edw, Ithon, and Upper Wye reservoirs—the whole of those proposed by the Chief Engineer in his report; but, in accordance with the terms of the reference to the effect that they should consider whether any better sources of supply were available, they extended their inspections to the Mid-Wales and North Wales districts, and included Bala Lake, as well as the reservoirs proposed by Mr. Bateman in 1865 at Trefeglwys on the Tarannon, and the Rivers Carno, Clywedog, and Dulas, tributaries of the Severn, which it was proposed to intercept for the service of that reservoir, as also the sites for reservoirs at Garthbibio and Llanerfyl on the River Banw, a tributary of the Severn, and on the Nant-y-Eira, a tributary of the Banw. They likewise visited the works in progress for the supply of Birmingham on the River Elan, a tributary of the Wye, and the completed works for the supply of Liverpool on the Vyrnwy, a tributary of the Severn. Particulars of these works are given.

The introductory portion of the report closes with brief references to the lake districts of Cumberland and Westmoreland, as well as to Dartmoor, as sources of water. But owing to their distance from London, and for other reasons, these districts are not favourably regarded by the Engineers.

(To be continued.)

* See "JOURNAL," Vol. LXVI., pp. 406, 449, 497, 548.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The event of the week has been the promulgation of the scheme of Mr. William Foulis, for the erection of new gas-works for the Corporation of Glasgow. A year ago, the Gas Committee had all but secured a site for new works, on the banks of the River Clyde, near Rutherglen. It was in every way desirable; and great disappointment was consequently experienced when it was discovered, by means of boring, that the site was full of underground workings. It had, therefore, to be abandoned. Since then the search for a site has been going on without interruption; and now Mr. Foulis has settled upon one at Blochavin, which is almost direct north of the Rutherglen site, and at about the same distance from the city. It is not nearly so good a situation for a gas-works as was the Rutherglen one; being at a considerable elevation above nearly the whole city. It possesses the enormous advantage, however, of having no workable coal below it, and of being served by the canal, which has been found to be exceedingly useful before now in times of strikes. The subject was introduced to the Gas Committee on Friday of last week, when Mr. Foulis submitted a report upon it. A Sub-Committee were then appointed to consider and report upon Mr. Foulis's recommendations. The Committee visited the site on Tuesday; and on Thursday the subject was brought up in the Council. There is a standing order in the Town Council of Glasgow, that all proposals for going to Parliament must be before the Council not later than the first week in October. It was necessary, therefore, to have the matter under the notice of the Council this week. This was all that was done; further consideration of the subject being delayed till the report of the Sub-Committee has been received. It need be no matter for surprise that the proposal is not meeting with unqualified approval. One Councillor objects that it is too near the Alexandra Park. Another, who resides in the district, considers that they are bad enough off already in that quarter; and he objects to the smoke being added to. Of course, the latter is a strange doctrine. According to it, anything which is objectionable should be put down in the most beautiful spots. I think there will be general agreement that gas-works are not desirable neighbours, though they are by no means a nuisance; and that, if they are to be put anywhere, it should be where there are works already, which are not the most beautiful. Now, in this locality there is already a large steel-works, a refuse destructor, a distillery, and a prison. The addition of a gas-works should not spoil the amenity of the district very much. On this ground, therefore, the proposed site is not open to objection. The probability is that it will be approved, provided the price can be agreed upon, as to which there is as yet no information. As showing the great difficulty there is in getting a suitable site for a gas-works in the neighbourhood of Glasgow, I may mention that this place is stated to be the only spot within nine miles of the city which is not troubled with underground workings.

The Edinburgh and Leith Gas Commissioners take a hopeful view of their future, as was shown by the tone of the speeches at their meeting on Monday, at which they continued the price of gas at 3s. per 1000 cubic feet.* They have good reason for this attitude. It is ten years now since they acquired the gas undertakings; and though they have not been without adversities, and particularly have had to work under disadvantageous conditions, their business has prospered immensely. That it will continue to grow, there is not the faintest occasion to doubt; and that it will be more economically conducted is equally certain. The chief difficulty which the Commissioners have to face in the near future is that of finance. At present, the suggestion which finds favour is to make the Corporation of Edinburgh their banker, and to borrow from them whatever is required. This is probably the cheapest method which they could adopt for the raising of money. Where care will require to be exercised is to get the funds into a position in which the price of the old works, when sold, will be immediately available for reduction of the debt upon the undertaking. Corporation loans require to be repaid, in stated proportions, in thirty years. Mortgages, which are also spoken of, are similarly repayable at stated periods. Probably the Commissioners will not borrow all that they require, either from the Corporation or upon mortgage. In this event, there will come a time, as the new works are nearing completion, when it will be advisable to obtain a floating loan, repayable at any date, or at short notice. The price of the old works would be available, when it came in, for wiping this out. It is matter for consideration, however, whether this should be the method; or whether it would not be as cheap, or cheaper, to borrow at a low rate of interest for a fixed period, and, when the old works are sold, invest the money in such a way that it could be used to pay off instalments as they fall due. The first plan would be the simpler of the two, but the second would give more freedom as to the time when the old works would be exposed for sale; this being a matter of probably as much importance, as implying loss or gain, as any question of rate of interest can be.

A public inquiry was held in Dundee Sheriff Court, on Thursday, into the circumstances which led to several fatal results to workpeople. One of these related to the death of David Pearson, a stoker in the employ of the Corporation of Broughty Ferry, which took place in the gas-works on the evening of Friday, Sept. 9 last. Pearson was working in an excavation, 9 ft. 9 in. deep, in front of the retort-bench, when a fellow workman observed him fall backwards. This man was unable to get his unfortunate comrade out of the pit, and so ran for the Manager. The poor man was dead when rescued. The medical evidence was to the effect that death was due to suffocation through inhaling carbonic acid gas. It is supposed that the man was overcome by some sudden ailment, which led to his falling. The oven he was working at had been out for several months, and had just been re-lighted when the accident occurred. Had the fire been properly started, the Manager said, the draught caused by it

* See page 822.

would have prevented the accumulation of noxious gas in the pit. Sheriff Campbell Smith remarked that, in his experience, fatal accident inquiries were useless for the purpose of getting information. All they pointed to was the necessity of protecting workmen against themselves. He did not know that they had got any information that day which would be of use to them, except it might be in the first case, in regard to the danger of going into a cavity or any place where carbonic acid might gather, or where oxygen might be burned out by fire. He thought that if the first witness had held Pearson's head up, instead of running for help, he might have saved the man's life. It was, however, very easy to be wise after the event. He questioned very much if the man knew anything about carbonic acid.

The Perth Gas Commissioners seem to be getting under way at last in the matter of the erection of new gas-works. A deputation of their number have been to Glasgow to see Mr. Foulis, whom they had consulted as to the plans. This deputation reported to the Commission at a private meeting on Thursday; and it is said that, after considerable discussion, Mr. Foulis's recommendations were adopted. Of course, they have yet to take estimates; and it was at this stage that the proceedings collapsed last time.

The North Berwick Gas Commission have decided to retain the price of gas for the year at 4s. 2d. per 1000 cubic feet. At this figure, though coal is 8d. per ton dearer, it is expected that there will be a surplus of about £100. Mr. Black, the Manager, reported that between thirty and forty gas-cookers are in use in the burgh; and that if more provision for producing gas be not made, it will be impossible to overtake the work next year. The Commissioners have appointed a Committee to treat with Mr. Hamilton-Ogilvy, with reference to the acquisition of a site for a new gas-works. The Commissioners some time ago sent out queries to the householders, to ascertain the feeling of the community upon the subject of the introduction of electric lighting. Only 51 replies were received. Of these, 25 were against; and it was found that the probable number of consumers would be 13, and the number of lights 794. On account of want of interest in the proposal, the Commissioners decided to abandon it.

The Town Council of Stirling had a feast upon the lees on Friday night, when they spent three hours considering the report of their Committee upon the Bill of the Gas Company. This report was laid before the Council early in August. It was, of course, a glorification of the Committee from beginning to end. A majority of the Council, however, considered that, before disposing of the report, they should have fuller information before them. They called for the production of all letters passing through the hands of the Committee on the subject of the Bill. A fortnight ago the Committee informed the Council that they had not printed the correspondence, chiefly because of "the enormous cost," which cost was estimated at only £15 to £20. The Council, on that occasion, were obdurate, and insisted upon the correspondence being produced and printed. Thereafter the Committee, or their supporters, seemingly afraid of their reputation should too much publicity be given to the correspondence, promoted a requisition to the Provost calling upon him to summon a meeting of the Council for the purpose of rescinding the order to print. It is strange that, though the Council had, on two occasions, directed the letters to be printed, when the requisition was hawked round among the members, means were found for inducing a majority of the Council to support it. This settled the question of rescission; and when the Council met, the opposition to the proposal was very easily and promptly crushed.

Then the Council took up consideration of the report on its merits. The discussion which ensued may well be described as having been both loud and long. Though the letters could not be had in print, they could not be altogether withheld from the members of the Council; and consequently several passages from them were read by the gentlemen who believe that the opposition to the Gas Company's Bill was carried too far. The most notable revelation in the reading of these passages was that, before the Bill was considered by the House of Lords Committee, Mr. Herring, of Edinburgh, advised that the Corporation should offer the Gas Company £55,000 for their undertaking. Mr. Herring was one of the Corporation witnesses. His suggested price was only £7000 below Mr. M'Gilchrist's valuation a year before. This represents about £200 a year; but the probability is that, if the offer had been made, the £55,000 would have been increased, and the difference lessened. The Committee were advised by their Counsel, before that time, to offer to adopt the Burghs Gas Supply Act in November. They did not give this undertaking; neither did they offer the £55,000. They thought they could do better. But these two incidents show (1) that Mr. M'Gilchrist's valuation of £62,000 was exceedingly near the mark; and (2) that the Corporation acted foolishly in not going in for a transfer of the undertaking. The discussion ended in the report of the Committee being adopted by 12 votes to 7. The Committee are thus acquitted; but this result has only been reached by their own votes. Had they not voted themselves, their report would have been rejected. I do not question their right to vote; but when the previous Council resolved to acquire the undertaking of the Company, the motion was only carried by the votes of some members who were also shareholders of the Gas Company. This circumstance was laid hold of by the party who are now in power; and it was used by them, with all the force they could exert, to alarm the public. And it succeeded. They should, therefore, in accordance with their own principles, have abstained from voting in this instance. But here, as elsewhere, circumstances alter cases.

The Cowdenbeath (Fifeshire) Gas Company have substituted acetylene gas for coal gas, as the illuminant they supply. The plant they employ is that of the Home and Colonial Acetylene Gas and Engineering Company, of West Regent Street, Glasgow. The new gas was turned on on the 3rd ult., by Mr. Jas. M'Conechy, the patentee of the plant. The change has been a popular one in the little town; the demand for acetylene gas having been such that the Directors of the Gas Company have placed orders for the duplication of their apparatus. Acetylene gas is also being introduced in Portsoy. A trial of it was made in the street-lamps last Saturday night, and was considered to be quite satisfactory. Workmen are meantime giving a general overhaul to service-pipes and fittings; and it is expected that by the end of next week lighting by acetylene gas will be general in the town.

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 805.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	22—23	−½	4 11 4
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 9
300,000	100	July 1	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd.	6¾—7	..	4 5 9
40,000	5	,,	6	Do. New, £4 paid	4½—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove. Orig.	262—267	..	4 6 2
226,320	,,	,,	8½	Do. A. Ord. Stk.	190—195	..	4 7 2
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	50—53*	..	3 16 11
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c.	20—22	..	3 17 3
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9¼	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd.	29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	15—16*	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Apl. 15	13½	Commercial Old Stock	315—325	..	4 3 1
200,750	,,	,,	10½	Do. New do.	252—257	..	4 1 8
200,750	,,	June 10	4½	Do. 4½ p. c. Db. do.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 13 2
200,000	,,	,,	9	Do. 7 p. c. Prf.	193—198	..	4 10 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c.	305—310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 9
5,922,230	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	292—297	..	4 2 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	120—125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	307—312	..	3 4 1
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	152—157	..	3 3 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	230—240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	195—200	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	307—312	..	3 4 1
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	185—190	+3	3 3 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk.	131—133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do.	148—153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do.	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	,,	10	Imperial Continental	228—233	+8	4 5 10
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk.	101—104	..	3 7 4
560,000	100	Oct. 1	5	Met. of Mel- bourne	5 p. c. Db.	110—112*	.. 4 9 3
250,000	100	,,	4½		4½ p. c. Db.	105—107*	.. 4 4 1

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	June 29	6	Malta & Medn., Ltd.	4¾—5¼	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd.	13½—14½	..	6 18 0
617,946	Stk.	Aug. 31	9¾	Newc'tle & Gatesh'd Con.	230—240	..	4 1 3
252,355	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	113—117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd.	7¾—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—7	..	5 2 11
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd.	5—5¼*	..	6 6 2
500,000	100	June 1	6	People's Gas of Chicago } 2nd M. Bd.	103—108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.	9¼—9⅜	..	6 3 1
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	99—101	..	3 19 3
250,000	10	Sept. 29	10	San Paulo, Ltd.	14½—15¾*	..	6 9 0
135,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
209,058	,,	,,	10	Do. B.	242—245	..	4 1 8
447,427	,,	,,	10	Do. C.	242—245	..	4 1 8
5,600,000	Stk.	Aug. 12	5⅓	South Metrop., 4 p. c. Ord.	140—143	..	3 14 7
1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk.	102—105	+1	2 17 2
60,000	Stk.	Aug. 31	12	Tottenham and Edmonton } A.	280—290	..	4 2 9
60,000	,,	,,	9	,, B.	200—210	..	4 5 9
182,380	10	June 10	7	Tuscan, Ltd.	10¼—11½	..	6 1 9
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
150,000	,,	,,	5	Do. 5 p. c. Prf.	170—175	..	2 17 2
160,000	,,	,,	4½	Do. 4½ p. c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Db. Stk.	155—160*	..	2 16 3
1,720,560	Stk.	Apl. 15	7†	East London, Ord.	215—220	..	3 3 7
654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
310,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140—145*	..	2 15 2
708,000	Stk.	Aug. 12	14	Kent	365—370	..	3 15 8
160,000	,,	,,	7	Do. New, 7 p. c. max.	212—217	..	3 4 6
1,043,800	100	June 29	10	Lambeth, 10 p. c. max.	300—305	..	3 5 7
406,200	100	,,	7½	Do. 7½ p. c. max.	227—232	..	3 4 8
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140—145*	..	2 15 2
500,000	100	Aug. 12	13½	New River, New Shares	435—440	+3	3 0 2
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	165—171	..	3 10 2
126,500	100	,,	6	Do. do. 7½ p. c. max.	160—165	..	3 12 9
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	170—173	+1½	2 17 10
1,019,585	,,	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141—144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	,,	Sept. 15	3	Do. 3 p. c. Db. Stk.	102—105	..	2 17 2

* Ex div.

† Next dividend will be at this rate.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 8.

Sulphate of Ammonia.—There has again been a slow market. Prices have, however, been fairly well maintained; but more because of small supply than by reason of demand, which has been very limited, and mainly for covering sales for immediate delivery. Consumers have been altogether indifferent; being able to buy cheaper ahead, and their requirements being in no way urgent. In the forward position, speculators have been offering abroad freely at a substantial discount on spot prices. But buyers seem still inclined to wait for larger production and the chance of a further decline; and only a moderate business has actually been done. Scotch makers continue to quote £9 17s. 6d. per ton, ordinary terms, October-March delivery, f.o.b. Leith; but London, Beckton terms, may be had at £9 12s. 6d. for months ahead.

Nitrate of Soda is firm in all positions. Spot quotations are 7s. 7½d. per cwt. for good, and 7s. 9d. for refined quality.

LONDON, *Oct.* 8.

Tar Products.—This market is very disappointing. Benzols, it was hoped, might see some improvement as the season advanced. But they are weaker than ever; and, if the enormous quantities of naphtha and benzols, which are coming on the market, continue, there seems but little hope of improvement. Crude naphtha, however, has reached a price that must surely find for it an outlet in other channels. Pitch is moderately steady; but the price does not improve. No interest is taken in anthracene; but it continues to be quoted nominally at an unremunerative figure. Carbolic acid does not gain in price. But there is a regular consumption apparently of what is produced; and the parity between crude and crystals is more uniformly maintained than formerly. Speculative prices are being paid for tar; and, unless some improvement comes over products, buyers will regret their purchases.

Business during the week may be marked as follows: Tar, 14s. to 19s. Pitch, east coast, 25s.; west coast, 23s. Benzols, 90's, 8½d. to 9d.; 50's, 9d. Toluol, 1s. 1½d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 3½d. Creosote, 2⅝d. Heavy oil, 45s. to 50s. Carbolic acid, 60's, 2s. Naphthalene, 55s.; salts, 32s. 6d. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—There is a determined effort to depress this article; and, so far, dealers have been successful. But it is doubtful if any important business is being done at the reduced quotations. Makers were never less troubled about stock; and many are well sold at higher prices than now mentioned. To-day's market values are from £9 10s. to £9 13s. 9d. per ton, less 3½ per cent.

Bangor Gas Supply.—The Bangor City Council have received the sanction of the Local Government Board to the borrowing of £3000 for the purpose of improving the gas-works.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Business is moving on steadily and very satisfactorily throughout the coal trade of this district, with prices all round not only levelled up to the advance which was partial last month, but firm at the full rates. The better qualities of round coal are moving off pretty freely; and though perhaps here and there in some qualities the whole of the output is not just at present being disposed of, only very small quantities of stock are accumulating, and pits are being kept on full time. The lower qualities of round coal continue in active demand; and no difficulty is experienced in maintaining full prices for these. Good ordinary qualities of steam coal average from 7s. 6d. to 8s. per ton at the pit. With regard to engine classes of fuel, there is a decidedly stronger tone since the commencement of the month. Notwithstanding the activity in the round coal trade, supplies of slack are in some quarters becoming scarce; and one explanation of this is that a considerable quantity is now being shipped for use in steamers, as during the protracted South Wales dispute this class of fuel has been found very adaptable and economical, under certain conditions, for marine boilers. A fairly large quantity of slack is also being exported to the Continent. The result is that prices are hardening; and, on forward contracts especially, advances on current rates are being very generally quoted. At the pit, common slack now averages 3s. 9d. to 4s. per ton; medium, 4s. 3d. to 4s. 6d.; and best sorts, 4s. 9d. to 5s. 3d. In the shipping trade, there is a very perceptible slackening off in the demand for round coals; and prices continue to ease down. Inferior sorts are now obtainable at 9s. to 9s. 3d. per ton, with better qualities quoted 9s. 6d. to 9s. 9d., delivered at Mersey ports.

Northern Coal Trade.—There has been a very full demand for coals; but the scarcity of steamships has rather limited the quantity sent out, and has caused a slight weakness in the price of one or two classes for very prompt delivery. Best Northumbrian steam coals are now quoted 9s. 9d. to 9s. 10½d. per ton f.o.b.; second qualities, 9s.; and steam smalls, 6s. The latter are scarce. In the manufacturing coal trade, the demand is steady and the prices unaltered. Gas coals have varied in the last few days, owing to one or two collieries accepting rather lower prices to obtain early shipment; but the price for forward delivery is still steady. Quotations for gas coals have thus fluctuated between 9s. 6d. and 11s. per ton f.o.b. according to time of delivery. Gas coke is scarce; and for shipment higher prices are quoted—about 12s. 6d. per ton f.o.b. being named as obtainable. The local prices of gas coke are unaltered.

Scotch Coal Trade.—The coal market was not so strong last week; but what fall had taken place in prices was looked upon as only temporary. The demand continued good, and is likely to remain so. The prices quoted were: Main, 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow; ell, 9s. to 9s. 3d.; and splint, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 206,415 tons—an increase of 17,044 tons over the previous week, and of 13,642 tons over the corresponding week of last year. For the year to date, the shipments have been 7,451,763 tons—an increase upon the same period of last year of 1,395,967 tons.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
ROCHESTER	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
MONTREAL	500,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000

Cubic Feet.

Cost of Opposing the Bury Corporation Water Bill.—The Haslingden Town Council incurred expenses to the amount of £1500 in opposing the Bury Corporation Water Bill last session; and Rawtenstall has an account of £2000 to meet.

Hereford Gas Profits.—Mr. Wallis, the present Chairman of the Gas Committee of the Hereford Corporation, is to be congratulated. At the last meeting of the Council, it was stated that, notwithstanding a reduction of 6d. per 1000 cubic feet in the price of gas since Mr. Wallis commenced his chairmanship, a drop in the price of coke, and an increase in the illuminating power of the gas, a profit of £3573 had been earned during the past year.

The Relative Prices of Gas and Steam Coals.—A curious anomaly, says a writer in last Tuesday's "Newcastle Chronicle," is now witnessed in the Northern coal trade. It has long been the rule for gas coals to be below steam coals in price. Now the former are higher in price in the market than the latter. The steam fuel was much above the gas coals; but the restarting of the Welsh pits brought down the prices unequally. For steam coals, the best time of the year is rapidly passing; but for gas coals it has yet to come—hence the unusual relation of the prices of the two kinds.

The Maidstone Typhoid Epidemic.—The Maidstone Urban District Council had under consideration last Thursday the letter recently received from the Local Government Board intimating that they could grant a loan of only £15,000 for three years to cover the cost of the typhoid epidemic of last autumn. The borough authorities had applied for sanction to borrow £18,000, the actual cost of the epidemic to the ratepayers, the repayments to be spread over a period of twenty years; and the decision of the Board had come as a great surprise to them. The Council resolved that Mr. Chaplin should be asked to receive a deputation on the subject. It was pointed out that Worthing was granted a loan for ten years in similar circumstances; and it was urged that Maidstone, having regard to the greater severity of the epidemic from which it had suffered, had a right to expect equally generous treatment.

The Reigate Corporation and the Gas-Works.—The Reigate Town Council recently had a special meeting to consider the propriety of promoting a Bill next session for acquiring the undertakings of the Reigate and Redhill Gas Companies, and to take such measures in relation to the matter as might appear expedient. The Mayor (Mr. F. E. Barnes) moved a formal resolution sanctioning the project. Mr. Kenrick proposed, as an amendment, that the consideration of the question should be postponed until a certain motion standing on the *agenda* for the next meeting had been disposed of. This motion was to the effect that, in any Bill promoted for the purchase of the gas-works, powers should also be applied for to acquire the Redhill Market Hall and land adjacent for the purpose of erecting municipal buildings. Upon the amendment being put to the vote, the numbers were equal; and the Mayor gave his casting vote against it. The original motion was then submitted, and its adoption was voted for by 10 members, while 2 were against it. There not being 13 members in its favour (the statutory majority of the Council), it fell to the ground.

The Supply of Water to Townships by Liverpool.—A Local Government Board inquiry was held at Cholmondeley last Friday with reference to the application of the Nantwich Rural District Council to borrow £1830 for obtaining a supply of water from the Liverpool water-mains for the townships of Cholmondeley and Egerton. Opposition was offered to the scheme on behalf of Sir Philip Egerton as the largest landowner in the latter township; but it was withdrawn on condition that the rate should be fairly apportioned.

Whitchurch Gas-Works Purchase.—At the meeting of the Whitchurch District Council last Tuesday, the Lighting Committee recommended that the purchase of the Gas Company's undertaking and works be proceeded with, and that notice be given to the Company to that effect. They also proposed that steps be at once taken to obtain the necessary Act of Parliament. The Clerk (Mr. Churton) read an agreement which had been arrived at with the Gas Company, and which was to the effect that the Council had the option of purchasing within two years the works and plant of the Gas Company for £35,000. Mr. Ledsham, in moving the adoption of the report, stated that the matter had been gone into thoroughly; and the Committee were satisfied there was sufficient margin for the working of the Company to give a profit to the rates. About £1000 would be required for the purchase of the stock in the hands of the Company; so that they would have to deal with £36,000. The discussion was adjourned to a special meeting on Friday, when Mr. Ledsham expressed the opinion that the Company's offer was a fair if not a liberal one; and the Council would be badly advised not to accept it. The profits of the Company for the past four years had been: In 1895, £1316; 1896, £1410; 1897, £1767; and 1898, £1653. The motion was carried unanimously.

New Reservoir for Loughborough.—A report was presented to the Loughborough Town Council yesterday week by the Water Committee, in which they asked to be at once empowered to make arrangements for the commencement of a new storage reservoir at Blackbrook, which, according to their Act of Parliament, must be completed by June 3, 1905. Owing to the dependence of the borough on the Blackbrook stream, it might be necessary, it was pointed out, to suspend the construction during the summer months each year; and therefore a longer time would be occupied by the work than would be the case under other circumstances. A report showing the necessity for, and urgency of proceeding with the construction of, the reservoir was also submitted by Messrs. G. & F. W. Hodson. The proposed reservoir, when filled to the level of 60 feet above the brook, will hold 506 million gallons, or 253 days' supply of 2 million gallons, which is sufficient to balance the yield of the brook over three dry years. The Council assented to the Committee's request; but before doing so, they were supplied with some figures by Mr. R. S. Clifford, which showed that the amount sanctioned to pay for the works was £65,000, and the interest on this at 3 per cent. would require £1950 per annum. After the completion of the works, an additional £478 would be needed for the sinking fund—the loan being repayable in sixty years. Several loans, however, raised to defray the cost of other works, will have been paid off before the new sinking fund will have to be commenced.

NEW DESIGN No. B3895
(With Projecting Fire)
PRICE 24s.

GAS-FIRE SEASON 1898.

BEFORE ORDERING, SEE OUR

NEW DESIGNS

Unequalled,

Unapproached, and

Without Imperfection.

JOHN WRIGHT & CO.

LIMITED,

BIRMINGHAM & LONDON.

The Oldest and Largest Gas-Stove Makers in the World.

Atherstone Water Supply.—At the last meeting of the Atherstone Rural District Council, it was resolved that the cost of the joint water-works to be carried out for the district should be divided in the following proportions between the several parishes served: Atherstone, three-eighths; Baddesley Ensor, three-eighths; Baxterley, one-eighth; Bentley, one-twelfth; and Merevale, one twenty-fourth.

Oldham Gas Workers and their Wages.—Application has been made by the members of the Gas Workers' Union in the employ of the Oldham Corporation for an advance of wages, amounting to 6d. per shift. They also demand time-and-a-half for what they call "three Sunday shifts," instead of time-and-a-half for "two Sunday shifts." The formal notice has been sent to the Town Clerk, who will pass it on to the Gas Committee for consideration.

Blackburn's Water Supply.—The Water Committee of the Blackburn Corporation have instructed Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the East London Water Company, to prepare a report as to the present storage capacity of their works, and the possible future requirements. Mr. Bryan was entrusted by the Corporation with the construction of their system of water-works, and is therefore thoroughly acquainted with the undertaking and the best method of developing it to meet the increased requirements of the district. The capacity of the present works is calculated to be equal to the demand for some dozen years; but this is not regarded as being sufficient, and extensions are contemplated.

Gas Explosion Through a Broken Main.—Considerable damage was caused on the 1st inst. by an explosion of gas which took place in Lorrimore Avenue, Devonport. There was a smell of gas at No. 52, and a cupboard under the stairs, in which the meter was placed, was opened. The cupboard appears to have been full of gas, which ignited at a burner in an adjoining room, and there was an explosion which blew out the windows, damaged the furniture, and caused slight injury to the occupier of the house and his wife. On investigation by the officials of the Gas Company, it was found that the main had been fractured by the shrinking of the ground. A water-pipe was broken near the place a few days before from the same cause.

West Gloucestershire Water Company.—It was reported at the recent half-yearly meeting of this Company that the accounts for the six months ending Aug. 27 showed that, after paying all working expenses and interest on debenture stock, there was a net profit of £1873, which, together with £136 brought forward, made a total of £2009 to the credit of the revenue account. From this the Directors recommended the declaration of an increased dividend, less income-tax, at the rate of 4 per cent. per annum. This would absorb £1818; leaving £191 to be carried forward. The business, it was stated, continued to progress; and the total annual estimated income had now reached £6029. At a subsequent special meeting, it was agreed to issue 1500 £10 ordinary shares.

The Public Lighting of Halesowen.—The question of the public lighting of the town again bulked largely at the meeting of the Halesowen District Council last Wednesday. The Clerk read a considerable amount of correspondence which showed that the Council were now prepared to enter into an agreement to pay £3 per lamp for two seasons, but that the Gas Company required £3 5s. per lamp for one season, £3 2s. 6d. for two seasons, and £3 for three seasons. In the discussion, Mr. T. Williams said the ratepayers were practically unanimous that the demands of the Gas Company were unreasonable; and he moved that the revised terms be not accepted. This was carried; and the Chairman stated that he should call a public meeting to consider the question. It was decided to accept the offer of the Birmingham Corporation to erect and light gas-lamps in the district of Quinton; the terms being considered to be very satisfactory—one member remarking that the average cost of lighting each lamp would not be more than 30s.

Water in the East Kent Chalk Area.—According to the correspondents of several of the London daily papers, for some time past a series of important and interesting experiments have been made in East Kent with the object of ascertaining the water-producing powers of the great chalk areas. The investigations have produced some valuable results, particularly in regard to the enormous quantities of the purest spring water which runs to waste daily by being poured into the sea from the base of the chalk cliffs. From observations made, it is estimated that at least 100 million gallons of water are lost in this way daily in the St. Augustine's Division of East Kent alone. The experiments have been made at intervals over a period of two or three years; and, notwithstanding the great drought which is affecting the upper springs all over the country, the tests made during the past few days at the base of the cliffs between Dover and St. Margaret's show that there is absolutely no diminution in the supply of spring water as compared with the past three years. The springs are visible at low water. It is believed that these outflows of water from the chalk strata occur all along the seaboard from Dover to the Medway; and much of it could be collected at the outlets without injuring anyone. The farthest of the springs at the extreme eastern end of Kent are not more than 60 miles from the eastern end of the London water supply district. Between Dover and St. Margaret's there are many outflows of spring water from the base of the chalk which have never been gauged at all; and it is well known that in the marshes near Wingham, between Canterbury and Dover, there are other great outflows of spring water at the surface.

Rainford Water Supply.—At the offices of the Rainford Urban District Council, Mr. G. W. Willcocks, one of the Inspectors of the Local Government Board, recently held an inquiry into an application by the Council for sanction to borrow £6000 for providing the township with a proper water supply. Mr. B. Smith, the Clerk to the Council, informed the Inspector that the area of the district was 5166 acres, the estimated population 3472, and the annual assessable value £20,200. The Council had at present no outstanding debt, as there was no sewage scheme in the district. The supply of water from surface wells was very inadequate; and after careful consideration the Council had adopted a scheme embodied in an agreement completed with the St. Helens Corporation. The water was mostly wanted for the three congested districts at Rainford Village, Rainford Junction, and Crank; and the agreement with the St. Helens Corporation provided for a supply up to 50,000 gallons a day, though it was estimated that the present needs of the township would be only about 27,000 gallons daily. The agreement was for thirty years; and the Council asked that the proposed loan might be spread over this period. Dr. Prosser, the Medical Officer of Health for the district, said the surface wells were seriously deficient in the summer season. He had specially examined about 80 wells—half the total number—and not more than three contained really good water. Three years ago there was an epidemic traceable to the well water, which had become contaminated. He considered that there was a great necessity for a proper supply. Mr. J. J. Lackland, the Water Engineer of the St. Helens Corporation, explained the plans of the proposed scheme; and as there was no opposition, the inquiry terminated.

Satisfactory Position of the Water Supply of Hull.—Few water engineers can at the present time boast of being in such a safe position in regard to their supply as Mr. F. J. Bancroft, the Water Engineer of Hull. Responding to an invitation to make a statement on the subject at a recent meeting of his Committee, Mr. Bancroft said that, during the present drought, he had not received a single complaint of shortage; for they had been able to keep up the supply both in quantity and pressure. They had not quite finished the adit work at Cottingham; but so far as he was able to judge, they would have about 3 million gallons of water in excess of what they previously had there. He had not the slightest hesitation in saying that, if they had not undertaken this work last year, they would have had a shortage this year, if not an actual famine. The amount of water available at Spring Head and Cottingham was, roughly speaking, 14 million gallons per day. The amount pumped into the district daily was between 10 and 11 millions; leaving a margin of between 3 and 4 millions, which would be sufficient to take them on for ten years with the ordinary increase in consumption. He did not mean to say the Committee would be able to sleep for ten years. They would have to look ahead at the end of about five years, so as to be ready to meet the extra demand when it came. The measure of the ability of a water-works to supply the inhabitants was the maximum consumption in the summer. Several statements of the average consumption in different parts of the kingdom had been published, and one had put that of Hull at 43 gallons a day; but this was not the maximum amount they had supplied. During six days of drought, they supplied an average of 47 or 48 gallons per head.

The contract for the supply of cast-iron pipes of 6 inches diameter and under, to the Glasgow Corporation Gas Department, has been let to Messrs. Shaw and M'Innes, Firhill Iron-Works, Springbank, Glasgow, for the next twelve months.

Messrs. Brown and Son, of Tottenham, have recently completed a deep-well boring at Messrs. Colman's starch-works at Bethnal Green, and have secured a supply of 8000 gallons of water per hour, from a 12-inch boring 400 feet deep. The same firm have also just completed a large well and borings at the Park Hospital, Hither Green, Lewisham, for the Metropolitan Asylums Board. A well has been sunk 100 feet, and lined with cast-iron cylinders 8 feet in diameter; and from the bottom two 16-inch borings have been made to a depth of 400 feet. An abundant supply has been obtained; the water rising to within 38 feet of the surface. The pumps are raising 20,000 to 22,000 gallons per hour, and the supply is stated to be equal to a million gallons per day.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Oct. 4, p. 780.]

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.
SPECIALLY favourable terms for Cycles.
First-Class Workmanship and Material guaranteed.
Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

IMPORTANT.
REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH,
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

PATENTS FOR INVENTIONS.
J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.
JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

HYDRATED OXIDE OF IRON.
PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BIRMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

ECONOMY IN PURIFICATION.
INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A GAS Engineer wishes to recommend a Youth (age 18) as PUPIL to the Gas Engineering Profession.
Address P.C., Glenholme, Staines Road, TWICKENHAM.

WANTED, at once, an experienced Tar STILL MAN.
State full Particulars and Wages required to No. 3144, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two first-class Main Layers accustomed to Joint Making and Service Laying. Wages 33s. per week.
State, by letter, Age and Experience to No. 3143, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Luton Water Company, an OFFICE CLERK, age not less than 18. One who has had experience in a Water-Works Office preferred. Salary £60 to £70 per year.
Apply, by letter, on or before the 22nd of October, 1898, with not more than three Testimonials, addressed to the CHAIRMAN, Luton Water Company, Crescent Road, Luton, BEDS.

WANTED, for a Gas-Works in the Midlands, a young Man as an ASSISTANT. He must have a knowledge of the ordinary routine of a Gas Office, and be capable of Testing for Impurities and Illuminating Power.
Apply, by letter, stating Age and Salary required, and enclosing three recent Testimonials, to No. 3142, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

JOHANNESBURG, Z.A.R.
THE Johannesburg Town Council are prepared to receive TENDERS for a complete CARBURETTED WATER-GAS PLANT.
Particulars and Specifications can be obtained from Messrs. Robert Whyte and Co., 22, Bury Street, St. Mary Axe, E.C., or from the General Manager, Lighting Department, Johannesburg Town Council, Z.A.R.
Tenders closed at Johannesburg by Jan. 6, 1899.
The lowest or any Tender not necessarily accepted.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of about 750 Tons of SPENT OXIDE.
Further Particulars and Form of Tender may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Spent Oxide," to be sent to me not later than Three p.m., on Thursday, Oct. 20, addressed to the Chairman of the Gas Committee, Town Hall, Salford.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
Oct. 8, 1898.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY and GANNISTER GOODS (Retorts, Bricks, &c.), required for Renewals and Repairs at their Neepsend and Effingham Street Stations during the next Twelve Months.
Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," addressed to the undersigned, must be delivered by post not later than the first post on Thursday, the 3rd of November.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Oct. 7, 1898.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of the above Company will be held at the Offices of the Company, 30, Gracechurch Street, in the City of London, on Tuesday, the 1st day of November, 1898, at Three o'clock in the Afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th day of June last, to declare a Dividend on the Preference Share Capital, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 19th of October to the 1st of November, both inclusive.

By order of the Board,
SAMUEL WOOD,
Secretary.

Offices: 30, Gracechurch Street,
London, Oct. 4, 1898.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 1st day of November next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 30th of June last, and the usual Ordinary Business of such Meeting transacted.
Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 18th inst. to the 1st prox., both days inclusive.
The Dividend will be paid on the 8th of November.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Oct. 10, 1898.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
(Late Essex Street Works, Victoria Embankment, London),
Telephone No. 95 Holborn.
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

SCARBOROUGH GAS COMPANY.

SALE BY TENDER OF NEW ORDINARY STOCK.
In Pursuance of the Scarborough Gas Act, 1895.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER NEW ORDINARY STOCK of the Company, to the amount of £16,000, such Stock to bear a Maximum Dividend of 5 per cent. per annum, and to be paid up in full on or before the 1st day of December, 1898; being a portion of the Additional Capital authorized to be raised under the powers of the above-named Act, by a Resolution passed at a Meeting of the Proprietors of the Company, specially convened for the purpose, and held on the 26th day of June, 1895.

Particulars and Condition of Tender may be obtained on application at this Office, and sealed Tenders must be sent in not later than Twelve o'clock at noon on the 1st day of November, 1898.

By order,
J. HOLLIDAY,
Secretary.

Scarborough Gas Company's Offices,
32, Westborough, Scarborough,
Sept. 15, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

£22,900 FOUR PER CENT.
PERPETUAL DEBENTURE STOCK,

Offering to Trustees and others an Investment of the highest class.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Tuesday, Oct. 18, 1898, at Two o'clock precisely, in Lots.

Particulars at the HEAD OFFICES OF THE COMPANY, in D'Olier Street, DUBLIN; and of the AUCTIONEER, 18, Finsbury Circus, LONDON, E.C.

By order of the Directors of the
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday Oct. 18, at Two o'clock, in Lots,

£10,000 OF ORDINARY STOCK
OF THE
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY,

Ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been at the rate of 6½ per cent.

Particulars may be obtained at the COMPANY'S OFFICES, 1, Athenæum Terrace, PLYMOUTH; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 18, at Two o'clock, in Lots,

500 £10 SHARES

(issued as fully paid) in the above Undertaking, ranking for a Maximum Dividend of 7 per cent.; the last Dividend on similar Shares having been 5½ per cent.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late G. E. Wood, Esq.

339 £10 SHARES IN THE
HAMPTON COURT GAS COMPANY
AND THE
WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 18, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

AUTOMATIC METER REGISTER

The Meter Life Book specially adapted, and revised for "Slot" Meter Registration by

ROBERT P. KEYS.

In sizes to record 1000 Meters, with Index, Half Bound	£2	2	0
To record 500 Meters	£1	15	0
To record 250 Meters	£1	11	6

The only Easy System yet projected.

PUBLISHED BY
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

NOW READY.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION
OF THE

HANDBOOK
FOR
GAS ENGINEERS AND MANAGERS.

BY

THOMAS NEWBIGGING,
M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

PRINCIPAL CONTENTS.

Introduction; Chief Kinds of Coal; Analyses of Coals and Cannels; Storage of Coal; Spontaneous Ignition of Coal; Gases Occluded in Coal; Testing of Coal for its Producing Qualities; Gas Production; Retort-House; Inclined or Sloping Retorts; Retort-Stack; Retorts; Retort-Settings; Regenerative System of Heating Retorts; Flues and Draught; Analysis of Furnace Gases; Retort-Bench Mountings; Hydrocarbon and other Gases and Vapours; Retort-House Tools and Appliances; Machine Charging and Drawing; Condensation; Naphthalene; Condensers; Exhausters; Steam Engines and Boilers; Washers; Tower Scrubbers; Washer-Scrubbers; Bye-Pass Mains and Valves; Tar and Liquor Wells and Tanks; Purification; Purifying-House; Purifiers; Limestones and Lime Burning; Station Meter and other Indicating and Recording Apparatus; Gasholder Tanks; Gasholders; Governors; Main-Pipes; Main-Pipe Joints; Wrought-Iron and Steel Main-Pipes; Laying of Main-Pipes; Discharge of Gas through Main-Pipes; Service-Pipes and Fittings; Public Lighting; Consumers' Gas-Meters; Testing-Meters; Internal Fittings; Gas Testing Appliances and Methods; Tests for Impurities; Illuminating Power; The Aerorthometer; Foreign and other (proposed) Home Standards of Light; Jet Photometers; Specific Gravity of Gas; Enrichment of Coal Gas; Public Illuminations; Coloured Fires; Illumination Devices; Use of Gas for Purposes other than Lighting; Residual Products; Coal Tar; Ammoniacal Liquor; Sulphur Recovery; Coal Products; Elementary Substances; Chemical and other Memoranda; The Gas Industry; Cost of Gas-Works; Miscellaneous; Bricks and Brickwork; Mortar and Concrete; Iron, Steel, and other Metals; Velocity and Force of the Wind; Office Memoranda; Epitome of Mensuration; Arithmetical and Algebraical Signs; Multipliers; Table of Diameters, Circumferences, Areas of Circles and Sides of Equal Squares; Weights and Measures; French Weights and Measures—Decimal System; Money Tables.

LONDON:
WALTER KING, 11, BOLT COURT,
FLEET STREET, E.C.

Now Ready, Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)
AT THE
SUTTON GAS-WORKS.

Designed and carried out by

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.,
MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &c., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	6s. 0d.
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	1s. 0d.
Flow of Gas, and Proportioning Gas-Mains	7s. 6d.

PUBLISHED BY
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

THE Acetylene Illuminating Company, Limited, 68, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

FIRE-BRICKS, FIRE-CLAY, & FURNACE CEMENT.

THE
FURNACE FIRE-BRICK CO., Ltd.
(Late JAMES WHITE & CO.)
WORKS:
Longcliffe, near Wirksworth, Derbyshire.

MANUFACTURERS OF
HIGH-CLASS FIRE-BRICKS, acknowledged to be the best obtainable for
GAS, IRON, AND CHEMICAL FURNACES.

For Analysis and Prices, address—

JAMES WHITE & CO.,
WIDNES, LANCASHIRE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

GAS PURIFICATION BY

HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD., CANAL ST., MILES PLATTING, MANCHESTER.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·78 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

INCANDESCENT GAS LIGHTING

Has now gained a complete and final **Victory** over its last and greatest Enemy

VIBRATION,

BY MEANS OF

CLAY'S PATENT

SHOCK-PROOF

Incandescent Burner Fittings

Of which full Particulars may be had from

CLAY & WALMSLEY,

BOLTON, ENGLAND.

Telegrams: "CLAYS, BOLTON."

See "JOURNAL OF GAS LIGHTING," July 7, 1896, p. 19, and Dec. 21, 1897, p. 1365.

London Representatives: H. Greene & Sons, Ltd., 153 & 155, Cannon Street, E.C.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

WELDON MUD

FOR

GAS PURIFICATION,

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,

— *LIMITED,* —

1, FENCHURCH AVENUE, LONDON, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE:

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.
London Office: R. Cull, 84, Old Broad St., E.C.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., Ld.
CHESTERFIELD.

WATERBLEAN PAINT
Telegrams: "EVESON, BIRMINGHAM."
EVESON FOR CANNEL

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co, BIRMINGHAM.

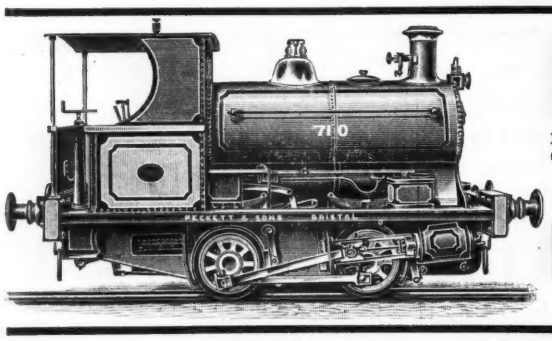
HEBBURN MAIN GAS COALS.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.
For Prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.
5 Lombard Street, NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.
For Prices and Particulars, apply to
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.
Manufacturers of MACHINE-MADE RETORTS and
FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.
For Prices and Analysis, apply as above.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.
Telegraphic Address: "WIGAN BIRMINGHAM." Telephone No. 200.
London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.
Telegraphic Address: "PARKER, LONDON."



LOCOMOTIVES
LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Work, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for Immediate Delivery.
Photographs, Specifications, and Prices on Application.
PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**
Telegraphic Address: "PECKETT, BRISTOL."

COAL.
THE BIRCHENWOOD COLLIERY COMPANY, Ld.
KIDSGROVE, STOKE-ON-TRENT.
Produce very HIGH-CLASS COAL, and can supply on PROMPT and FAVOURABLE TERMS

WALLSEND COAL.
HARECASTLE—
SEVEN-FEET BAMBURY.
EIGHT-FEET BAMBURY.
BEST BIRCHENWOOD.
BEST BIRCHENWOOD COBBLES.
LARGE WASHED NUTS.
MEDIUM WASHED NUTS.
WASHED BEANS.
WASHED PEARLS.
FOUNDRY COKE.
FURNACE COKE.

Telegraphic Address: "BIRCHENWOOD, KIDSGROVE, STOKE-ON-TRENT." Telephone No. 501.

H. KIRKHAM & CO.'S
IMPROVED WASHER-SCRUBBERS

We guarantee every Machine to extract 20 per cent. more of the Impurities contained in the crude Gas than may be required in the application for Tenders. Please defer ordering until you have seen our Patent Washing Devices fitted in Patent Cages. Prices quoted for Washer-Scrubbers or for Renewals to all Machines of the Kirkham, Hulett, and Chandler type.

Office: 335, MANSION HOUSE CHAMBERS, QUEEN VICTORIA STREET,
LONDON, E.C.

SAWER & PURVES,
(BRANCH OF METERS LIMITED),
NELSON METER WORKS, MILES PLATTING,
MANCHESTER.

WET PREPAYMENT METER.
CAST-IRON CASE.

SOLE MAKERS OF THE
"POSITIVE"
PREPAYMENT GAS-METERS
WET and DRY.

SIMPLICITY IN MECHANISM
Combined with
STRENGTH AND COMPACTNESS.

PRICE OF GAS EASILY CHANGED.

MADE TO TAKE ANY COIN.

PRICES AND ALL PARTICULARS CAN BE HAD ON APPLICATION.

MOBBERLEY & PERRY.
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c, &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY,
Gas Engineers and Contractors,
BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS,

MILTON HOUSE WORKS, EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.

Telegrams: "Robustness, London."

RETORT-HOUSE, SETTINGS, & RAILWAY

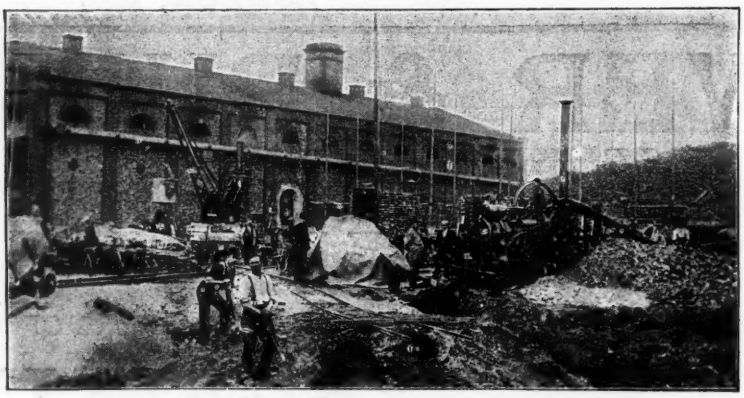
IN COURSE OF ERECTION BY OUR OWN WORKMEN.

Telephone: No. 756 Bank.

Plans, Estimates, and Specifications prepared and submitted.

Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS, SCRUBBERS, WASHERS, EXHAUSTERS, TANKS, and every REQUISITE.



A SPECIALITY.

INCLINED and FLOOR-LEVEL SETTINGS with or without REGENERATIVE or GENERATOR FURNACES, with or without IRONWORK. COMPLETE RE-SETTING.

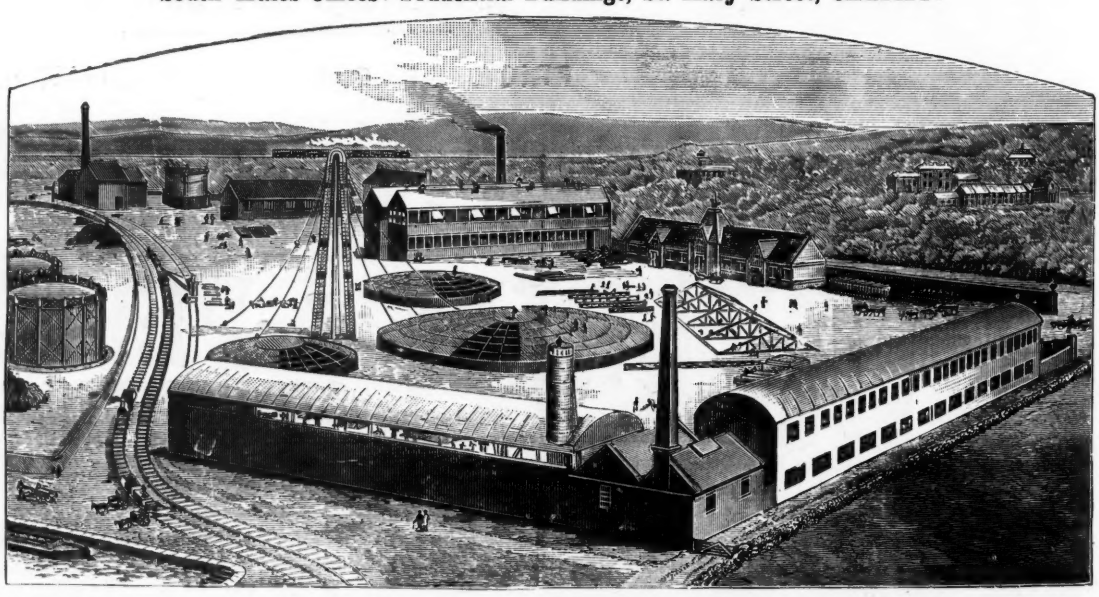
J. & H. ROBUS, Engineers and Contractors, 20, BUCKLERSBURY, LONDON, E.C.

GASHOLDER TANKS AND MAIN LAYING.

WILLEY & CO., GAS ENGINEERS,

OFFICES: EXETER. WORKS: 248, Kingsland Road, LONDON; James St., and St. Thomas, EXETER.

South Wales Offices: Prudential Buildings, St. Mary Street, CARDIFF.



MANUFACTURERS OF WATER-GAS PLANT, GASHOLDERS, GAS-FITTINGS, GAS APPARATUS, WET AND DRY CONSUMERS' METERS, AUTOMATIC METERS—PENNY-IN-THE-SLOT.

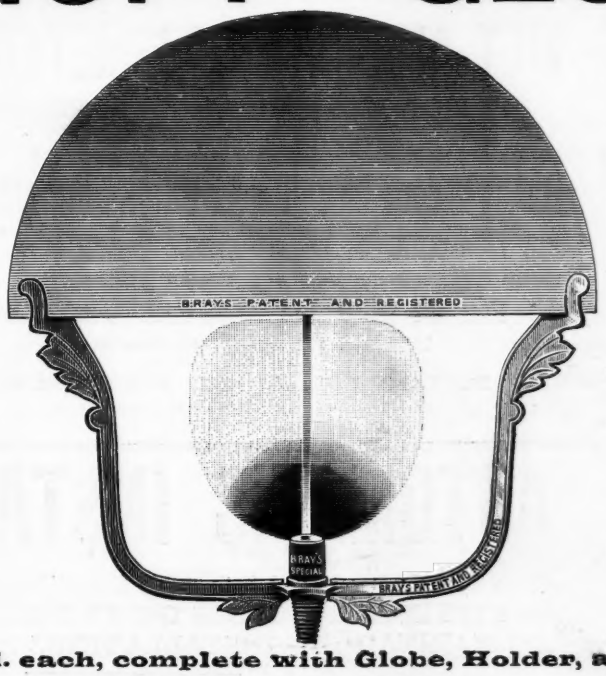
CONTRACTORS TO THE GOVERNMENT.

Telephone 132. Telegraphic Address: "WILLEY, EXETER."

BRAY'S PATENT
"CANOPY" GLOBES

They do not dirty Ceilings or get Black themselves, and preserve Decorations from Smoke.

Save in White-Washing and Decorations alone more than will pay the Gas Bill, and keep the House bright and clean.



Two "Canopy" Globes give more Light than Three Ordinary Globes.

In average use they give more light than Incandescent Burners, at less first cost, and about one twentieth the cost of renewals.

Price 3s. 6d. each, complete with Globe, Holder, and Burner.

GEO. BRAY & CO., GAS-LIGHTING ENGINEERS, BAGBY WORKS, LEEDS

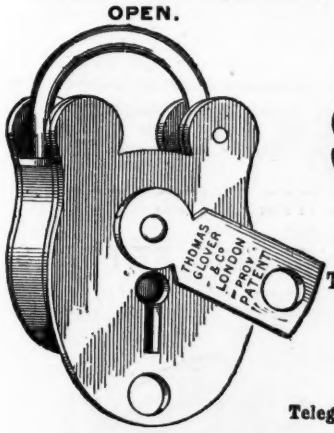
[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

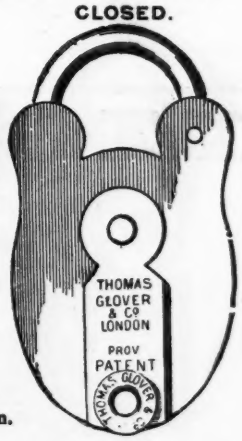
PATENT

SECURE PADLOCK

Prevents Tampering with the CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 1005.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC"*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* Telephone No 3898.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address: "GASMAIN."* Telephone No. 1525 South Side.

SERVICE CLEANER.

HUTCHINSON BROTHERS,

GAS ENGINEERS, &c.,

MANUFACTURERS OF IMPROVED

WET AND DRY GAS-METERS.

STATION-METERS. LAMP-METERS.

TEST GASHOLDERS & GENERAL GAS APPARATUS.

BRASS MAIN & LAMP TAPS. UNIONS, FERRULES, &c.

The "Falcon" Lamplighter's Torch. Service Cleaners.

SYPHON AND OTHER PUMPS.

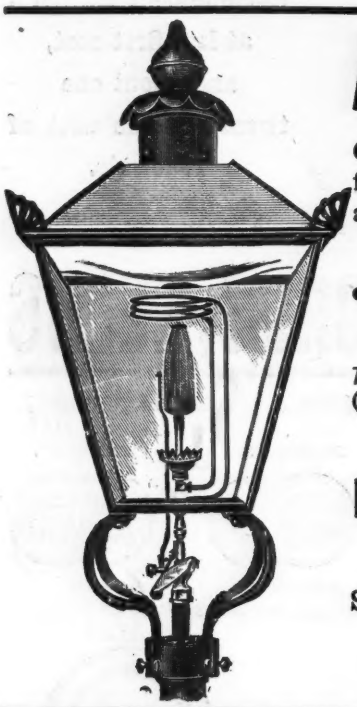
Wood and Wrought-Iron Purifier-Grids. Scrubber Boards

WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

LAMP SERVICE CLEANER.



AUTOMATIC INSTALLATIONS

CONTRACTS entered into with Gas Companies and Committees for **FITTING UP HOUSES ON THE COIN METER SYSTEM,** and **MAINTAINING INSTALLATIONS** for any number of Years.

Sole Agents for London and South of England for

CLAY'S PATENT SHOCK-PROOF FITTINGS,

which are the next best thing to **UNBREAKABLE MANTLES.**

The Illustration shows the NEW "ST. ALBANS" LANTERN, fitted with the new Burner (without Chimney), Clay's Anti-vibration Coil, and the TALBOT PATENT TAP, many thousands of which are now in use.

H. GREENE & SONS, Ltd.

(Late HENRY GREENE & SONS),

Gas Engineers and Lighting Contractors, Manufacturers, and Patentees,

Show-Rooms: 153 & 155, CANNON STREET, LONDON BRIDGE, E.C.

Works and Show-Rooms: 73, FARRINGDON ROAD, E.C.

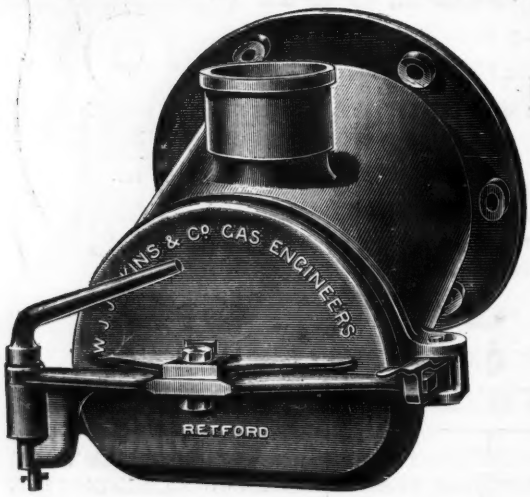
Three Minutes' walk from Farringdon Street Station, Metropolitan Railway.

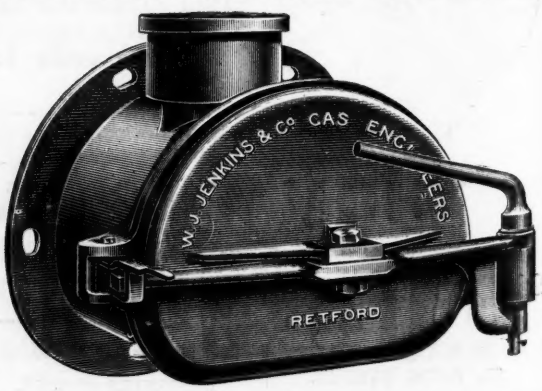
Telegrams: "LUMINOSITY, LONDON." Telephone: 5220, BANK.

MOUTHPIECES

WITH SELF-SEALING LIDS FOR

HORIZONTAL AND INCLINED RETORTS.





W. J. JENKINS & CO., LTD., RETFORD.

ASHMORE, BENSON, PEASE, & CO., LIMITED,

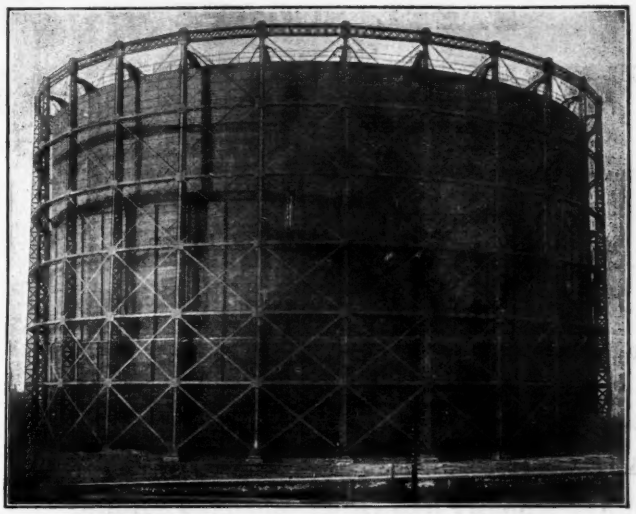
Manufacturers of COLUMNLESS GASHOLDERS (Pease's System)

Great Saving in Cost, and Absolutely Reliable in Working.

Samples of Holders, with Standards, to be seen at—

MANCHESTER . . .	250 ft. by 50 ft.,	Three Lifts.
EAST GREENWICH. .	250 ft. by 45 ft.,	,,
OLD KENT ROAD . .	214 ft. by 53 ft.,	,,
HASTINGS	110 ft. by 25 ft.,	,,
BATTERSEA. . . .	197 ft. by 46 ft.,	,,
NEWCASTLE . . .	130 ft. by 27 ft.,	,,
EASTBOURNE . . .	135 ft. by 30 ft.,	,,
ALTRINCHAM . . .	100 ft. by 24 ft.,	,,
DOVER	89 ft. by 24 ft.,	Two Lifts.
ATHERTON	80 ft. by 26 ft.,	,,
CLITHEROE. . . .	80 ft. by 20 ft.,	,,
BLYTH	50 ft. by 20 ft.,	,,
JOHANNESBURG (and Steel Tank) . . .	98 ft. by 20 ft.,	,,

And many other places.



Manchester (Three Lifts), 1896, with Standards.

SPECIALITIES: NEW PATENT WASHER-SCRUBBER, HYDRAULIC AND FOUL MAINS, STEEL TANKS, COLSON'S SULPHATE PLANT, SEMET-SOLVAY COKE-OVENS AND RECOVERY PLANT.

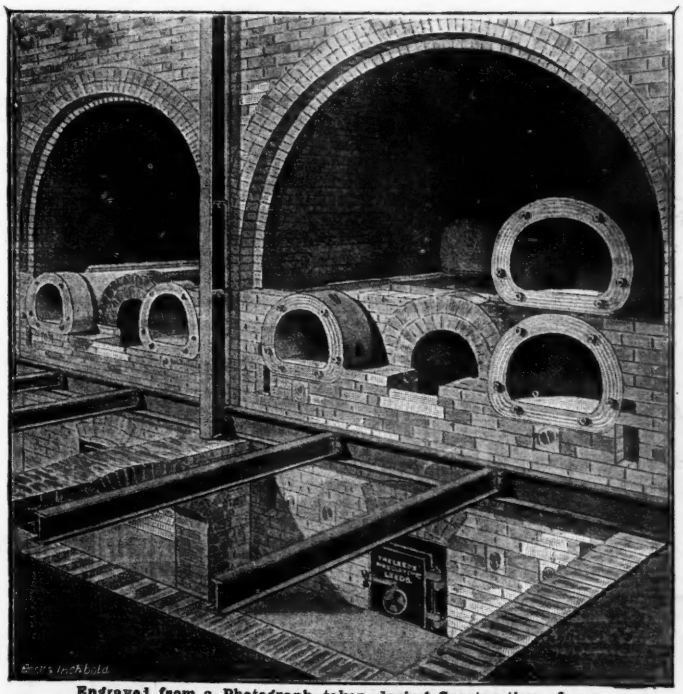
Works: STOCKTON-ON-TEES. Telegrams: "GASHOLDER."

London Office: 181, QUEEN VICTORIA STREET. Telegrams: "APPARATUS."

THE LEEDS FIRE-CLAY CO., LD., ENGINEERING DEPARTMENT

Telegrams: "SETTINGS, LEEDS." Telephone: No. 612.

WORTLEY, LEEDS.



Engraved from a Photograph taken during Construction of our Shallow Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION

INCLINED, HORIZONTAL,

REGENERATOR, GENERATOR,

and DIRECT FIRED.

SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.

EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.

RETORT IRONWORK.

COAL AND COKE-BREAKING AND CONVEYING MACHINERY.

BUILDINGS, ROOFS, &c.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

STEEL SCOOPS
FOR
RETORT CHARGING.

Scoops supplied with or without handles, and of any dimensions or shape required.

HENRY SYKES, Ltd., Engineers,
66, BANKSIDE, LONDON, S.E.

FOR WHOLESALE AND EXPORT TRADE ONLY.
WE OFFER IN BEST QUALITY:

Incandescent Mantles, transportable per 100	£1	15s. 0d.
,, ,, not heated ,, ,,	£1	2s. 0d.
Union Burners, suitable for all Systems ,, ,,	£3	0s. 0d.
Burners with Auer Top . . . . ,, ,,	£3	15s. 0d.
do. do. with bye-pass & chains ,, ,,	£8	15s. 0d.
Magnesia Forks . . . . . ,, ,,		2s. 6d.

CHIMNEYS AT LOWEST MARKET PRICES.

INCANDESCENT GAS-LIGHT COMPANY "UNION"
BERLIN O., 2, An der Stadtbahn 2.

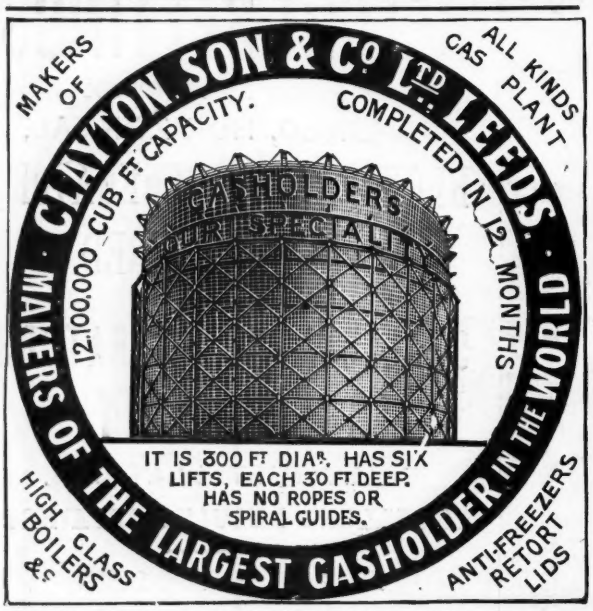
WILLIAM INGHAM & SONS,
Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.


MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITE
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "GAS, LEEDS," "ECLARAGE, LONDON."

GEORGE A. CHAPMAN,
Stock & Share Dealer,
51, MOORGATE ST., LONDON, E.C.

Dealer in every Description of Gas and Industrial Stocks.

THOMAS BUGDEN,
Manufacturer of

Gas Bags for Mains, High Water-Boots, Miners' Woollen Jackets, Delivery and Suction Hose, Leather Machine Bands, Diving and Wading Dresses, Waterproof Coats and Capes of every description, Iron Wheels and Rollers covered with India-rubber, Rubber Bags for Testing Drains. Stokers' Mitts, from 14s. per dozen.

Gas-Bags for Mains.

Miners' Woollen Jackets.

High Water-Boots.

71, GOSWELL ROAD, LONDON, E.C.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Oct. 4, p. 783.]

BEST & LLOYD
MAKERS OF THE **Limited,**
BIRMINGHAM.

PATENT "SURPRISE" PENDANT,
WITH PATENT SHADE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

Extract from the JOURNAL OF GAS LIGHTING, Jan. 8, 1895.

"IN CONJUNCTION WITH
THE INCANDESCENT GAS-LIGHT
it quite **supersedes** the familiar three-light pendent. We are able to bear witness to the **convenience** of the New Pendant.'

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1826.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

THE
FULLFORD GAS-LAMP

The TESTED, TRIED, and TRUE,

AGAIN
COMES TO THE FRONT,
AND IS
REPLACING
NEWER BUT
LESS SATISFACTORY SYSTEMS
FOR
Outside Shop Lighting
&c., &c.

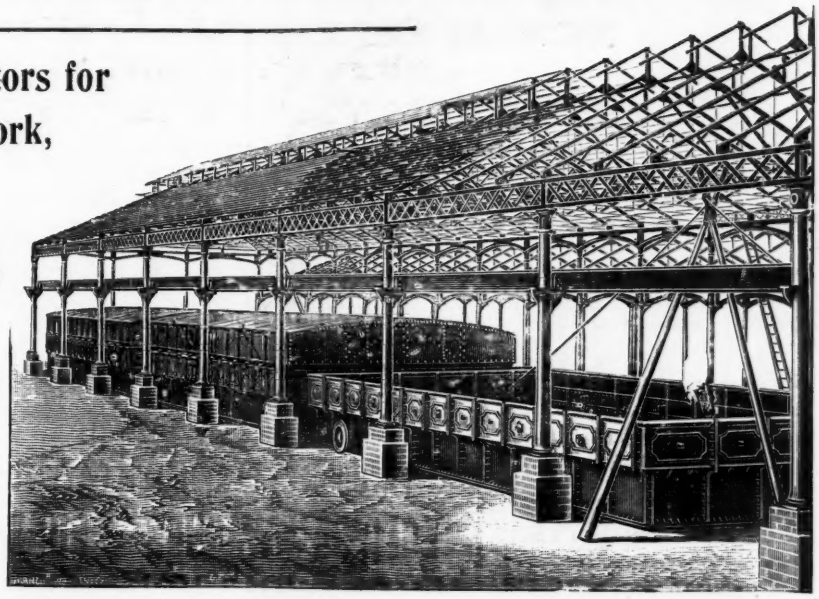
WRITE FOR CATALOGUE,
Which will be sent Post Free.

THE LAMP MANUFACTURING CO., LTD.
10, 12, & 14, LEONARD STREET,
CITY ROAD, LONDON, E.C.

R. & J. DEMPSTER, LTD., GAS PLANT WORKS,
Telegraphic Address:
"SCRUBBER, MANCHESTER."
National Telephone Nos. 54 and 2296.
NEWTON HEATH, MANCHESTER.

Engineers and Contractors for Construction Ironwork,

ROOFS, GIRDERS,
PURIFIERS, WASHERS,
SCRUBBERS,
CONDENSERS,
GASHOLDERS,
TANKS,
RETORT-MOUNTINGS,
VALVES, &c., &c.



Purifiers and Roofs erected at Windsor Street Works, Birmingham, to the Designs and under the supervision of C. HUNT, Esq., M.Inst.C.E.

London Office: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C.

JOHN BROWN & CO., LTD., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

LONDON OFFICE
60, QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES
"DRAKESON HALIFAX."
"ECLAIRAGE LONDON."

TELEPHONE No. 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

JONAS DRAKE & SON

SOLE AGENTS FOR
HISLOP'S
PATENT REGENERATIVE FURNACES
FOR
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE
WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.

OVENDEN HALIFAX

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

Designs and Estimates on Application.

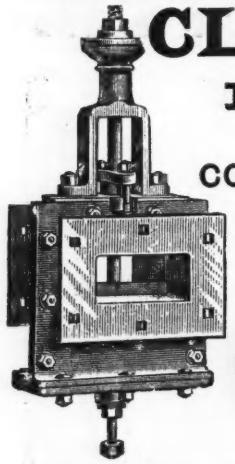
GASEOUS FIRING A SPECIALTY.

CLAPHAM BROTHERS, LD.

KEIGHLEY, YORKS.

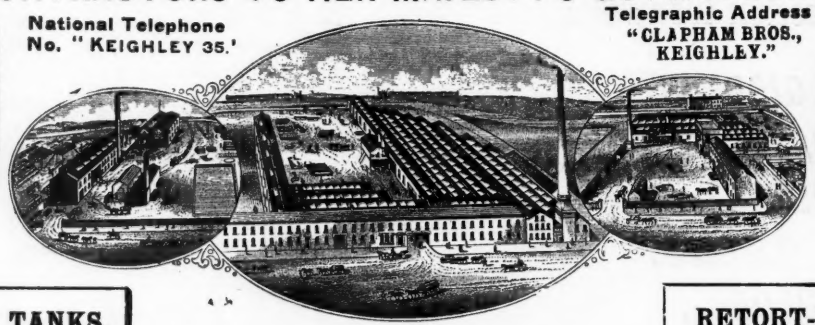
— ESTABLISHED 1837. —

CONTRACTORS TO HER MAJESTY'S GOVERNMENT.



National Telephone
No. "KEIGHLEY 35."

Telegraphic Address:
"CLAPHAM BROS.,
KEIGHLEY."



GASHOLDER TANKS,
COLUMNS, GIRDERS,
LAMP-POSTS, GUTTERS.

LAYCOCK & CLAPHAM'S PATENT
"ECLIPSE" WASHER-SCRUBBER.
Machines supplied will deal with a total of
92,670,000 cubic feet of Gas per day.

RETORT-FITTINGS,
PATENT CONDENSER,
PURIFIERS, WITH PLANED JOINTS.

London Representative:
THOMAS B. YOUNGER, C.E.,
Chesterfield House, 98, Great Tower Street.

Manchester Representative:
MAURICE SCHWAB,
96, Deansgate.

WATER VALVES & MAINS, and all kinds of Gas-Making Apparatus and General Ironwork.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London,—Tuesday, Oct. 11, 1898.